UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
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JUL 24 2003

Mr. Matthew T. Byrne
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Norfolk District, Corps of Engineers
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Norfolk, Virginia 23510-1096

Ms. Christina E. Correale
Chief, Operations Division
Department of the Army
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Dear Mr. Byrne and Ms. Correale:

Enclosed is the National Marine Fisheries Service's (NOAA Fisheries) Biological Opinion on the impacts of the Army Corps of Engineers (ACOE) maintenance dredging in the Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels, Virginia, on threatened and endangered species under NOAA Fisheries' jurisdiction. This correspondence is addressed to each of you as the ACOE Baltimore District manages Cape Henry, York Spit, and Rappahannock Shoal Channels, while the York River Entrance Channel is managed by the ACOE Norfolk District. This Biological Opinion was prepared pursuant to the interagency consultation requirements of section (7)(a)(2) of the Endangered Species Act. The ACOE requested reinitiation of consultation on February 6, 2003, due to the take of a live green sea turtle and a dead Kemp's ridley sea turtle during relocation trawling conducted in association with 2002 dredging activities.

Based on our review of the information provided in the 1993 Biological Assessment for maintenance dredging of the Cape Henry, York Spit, and Rappahannock Shoal Channels, the previous Biological Opinion dated January 24, 2002, correspondence with the Baltimore and Norfolk Districts, and available commercial and scientific information, NOAA Fisheries concludes that the maintenance dredging operations in the Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels may adversely affect but are not likely to jeopardize the continued existence of the right, humpback, or fin whale; loggerhead, leatherback, Kemp's ridley, green, or hawksbill sea turtle; or shortnose sturgeon. Because no critical habitat is designated in the action area, none will be affected by the project.

The Incidental Take Statement (ITS) issued with the enclosed Biological Opinion anticipates that dredging operations in the Cape Henry, York Spit, York River Entrance and Rappahannock Shoal Channels would result in the following levels of incidental take, determined by the estimated maximum amount of material to be dredged annually in all four channels combined, and two lesser amounts of material to be dredged:

- During any given calendar year, if the amount of dredged material to be removed equals 5 million cy or less (and is above 3 million cy) in either one or a combination of the four channels considered in the opinion, NOAA Fisheries anticipates that maintenance dredging operations may result in the observed take of 18 loggerhead and 4 Kemp's ridley sea turtles.

- During any given calendar year, if the amount of dredged material to be removed equals 3 million cy or less (and is above 1 million cy) in either one or a combination of the four channels considered in the opinion, NOAA Fisheries anticipates that maintenance dredging operations may result in the observed take of 10 loggerhead and 2 Kemp's ridley sea turtles.

- During any given calendar year, if the amount of dredged material to be removed equals 1 million cy or less in either one or a combination of the four channels considered in the opinion, NOAA Fisheries anticipates that maintenance dredging operations may result in the observed take of 4 loggerhead and 1 Kemp's ridley sea turtles.

- During any given calendar year, NOAA Fisheries anticipates that maintenance dredging operations may result in the observed take of one green turtle during any amount of maintenance dredging in all four channels.

The incidental level of turtle take in the hopper dredge is anticipated to be fresh dead. No incidental take for hawksbill or leatherback sea turtles is anticipated during hopper dredging as these species are relatively unlikely to be prevalent in the action area and interactions with the dredge are expected to be low. Additionally, incidental take of shortnose sturgeon or any listed marine mammal will not be authorized at this time.

NOAA Fisheries also expects that the maintenance dredging may take an additional unquantifiable number of previously dead sea turtle parts. A sea turtle take will not be considered related to dredge operations and count towards the above referenced anticipated take level if the condition of the specimen is in an advanced state of decay and if the specimen is a turtle part. Provided that NOAA Fisheries concurs with the ACOE's determination regarding the stage of decomposition, condition of the specimen, and likely cause of mortality, the take will not be attributed to the incidental take level for this project.

Additionally, NOAA Fisheries expects that relocation trawling in any of the channels combined may annually take an additional 120 live uninjured sea turtles (either loggerheads, Kemp's ridleys, leatherbacks, or greens, or a combination thereof). NOAA Fisheries further anticipates that one lethal take of a sea turtle (either a loggerhead, Kemp's ridley, leatherback, or green) may occur during relocation trawling. Trawling to relocate sea turtles out of the dredging channel may occur

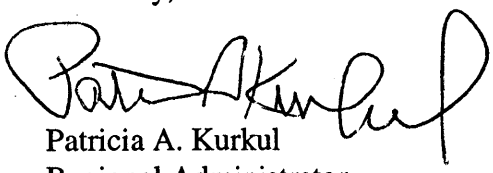
under certain circumstances prior to dredging, but takes of most turtles in the trawls are not expected to be lethal due to the short duration of the tow times and handling protocol.

NOAA Fisheries expects the ACOE to implement the reasonable and prudent measures and terms and conditions as outlined in the ITS. The measures of the ITS are non-discretionary and must be undertaken by the ACOE for the incidental take exemption to apply. For example, a sea turtle trawling and relocation survey must be initiated following the take of two turtles (any species) in a 24-hour time period or four turtles within a two month period, or in other circumstances that NOAA Fisheries deems appropriate.

This Biological Opinion concludes the consultation on maintenance dredging in Cape Henry, York Spit, York River Entrance and Rappahannock Shoal Channels. Reinitiation of this consultation is required if: (1) the amount or extent of taking specified in the ITS is exceeded for the identified action; (2) new information reveals effects of this action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species that was not considered in the Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

For further information regarding any consultation requirements, please contact Mary Colligan, Assistant Regional Administrator for Protected Resources, NOAA Fisheries Northeast Regional Office, at (978) 281-9116. I look forward to continued cooperation with the ACOE during future section 7 consultations.

Sincerely,



Patricia A. Kurkul
Regional Administrator

cc: Marsh, ACOE Baltimore District
Nichols, F/NER-OXF
Waring, ACOE Norfolk District
P. Williams, F/PR

File Code: 1514-05 (A) ACOE York River/Cape Henry Channel

NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Agency: Army Corps of Engineers, Baltimore and Norfolk Districts

Activity: Reinitiation of consultation on maintenance dredging in the Cape Henry Channel, York Spit Channel, York River Entrance Channel, and Rappahannock Shoal Channel, Virginia
(Tracking number: F/NER/2003/00302)

Conducted by: National Marine Fisheries Service
Northeast Regional Office

Date Issued: July 24, 2003

Approved by: Patricia A. Kurkul

This constitutes the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (BO) on the effects of the Army Corps of Engineers (ACOE) dredging in Cape Henry Channel, York Spit Channel, York River Entrance Channel, and Rappahannock Shoal Channel, Virginia, on threatened and endangered species in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). This BO is based on information provided in the 1993 Biological Assessment (BA) for maintenance dredging of the Cape Henry, York Spit, and Rappahannock Shoal Channels, the previous BO dated January 24, 2002, on maintenance dredging in Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels, recent correspondence with the ACOE Baltimore and Norfolk Districts, and other sources of information. A complete administrative record of this consultation is on file at the NOAA Fisheries Northeast Regional Office. Formal consultation was reinitiated on February 6, 2003.

CONSULTATION HISTORY

Maintenance dredging has previously occurred in Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels, and the ACOE and NOAA Fisheries have previously considered the impacts of this maintenance dredging on threatened and endangered species, including marine mammals and sea turtles. The ACOE Norfolk District first initiated consultation regarding dredging in York Spit Entrance Channel, and on March 30, 1993, NOAA Fisheries issued a Biological Opinion for the deepening and subsequent maintenance dredging of this channel. On January 26, 1993, the ACOE Baltimore District also initiated consultation for maintenance dredging of the Cape Henry and York Spit Channels when they requested NOAA Fisheries comments on the proposed dredging projects. After numerous correspondence, NOAA Fisheries recommended that the ACOE reinitiate the York River Entrance Channel consultation

to include York Spit, Cape Henry, and Rappahannock Shoal Channel projects under one overall consultation.

As such, formal consultation for maintenance dredging in the York River Entrance, Cape Henry, York Spit, and Rappahannock Shoal Channels was initiated on May 18, 1993, with the transmittal of the interim BA. A BO was issued on October 6, 1993. Based on existing information, NOAA Fisheries concluded that these dredging events were not likely to jeopardize listed species. The Incidental Take Statement (ITS) accompanying the 1993 BO authorized the annual take of 1 documented Kemp's ridley or green sea turtle or 15 documented loggerhead turtles by injury or mortality for the four channels.

On September 17, 2001, maintenance dredging of Cape Henry Channel began as the ACOE considered the current dredging project to be under the auspices of the 1993 BO. On September 26, 2001, one loggerhead turtle was taken in hopper dredging operations and on October 10, 2001, one Kemp's ridley was taken. This take of a Kemp's ridley met the previous Incidental Take level, but did not exceed the authorized incidental take amount, which would have triggered reinitiation of consultation. As of October 19, 2001, 350,000 cy of material had been removed from Cape Henry Channel.

After these two turtle takes occurred and NOAA Fisheries was contacted, the ACOE undertook measures to reduce additional sea turtle takes. On October 12 and October 15, 2001, NOAA Fisheries discussed the recent sea turtle takes, the measures the ACOE had implemented, and current dredging at Cape Henry Channel with the ACOE Baltimore and Norfolk Districts. At this time, it was acknowledged that the 2001/2002 maintenance dredging projects in Cape Henry and York Spit Channels were much greater than the amount of dredging previously considered in the 1993 BO. Specifically, the active dredging project for Cape Henry Channel was approximately two to five times the historical maintenance dredging quantity (2.9 million cy vs. 0.5-1.2 cy), and the York Spit dredging involved approximately six times the usual amount of material removed (1.3 million cy vs. 250,000 cy). This large increase in dredge material quantity was due to the limited dredging in the channels over the past few years due to funding constraints and recent hurricanes which greatly increased shoaling in the channels. The magnitude of material to be dredged is a reflection on the amount of funding available for these projects. As the magnitude of the project had increased, thus changing the potential impacts to listed species, NOAA Fisheries recommended that the ACOE reinitiate consultation for the Cape Henry and York Spit Channels to consider these impacts. Additionally, the impacts of dredging in all of the channels needed to be re-assessed due to the potential presence of shortnose sturgeon in all four channels, which was not considered in the 1993 BO. It was determined that the telephone conversation on October 12, 2001, between NOAA Fisheries and ACOE would serve as the reinitiation date for formal consultation on Cape Henry, York Spit, York River Entrance and Rappahannock Shoals maintenance dredging. A BO was issued on January 24, 2002, and concluded that the proposed action was not likely to jeopardize the continued existence of listed species found in the action area.

Before the start of the 2002 dredging season, the ACOE informed NOAA Fisheries that dredging events would occur in the warmer months and involve greater than 3 million cy (hence the ITS exempted the take of 18 loggerheads, 4 Kemp's ridleys, and 1 green turtle). During 2002 dredging activities in Cape Henry and York Spit Channels, 21 sea turtles (18 loggerheads, 2 Kemp's ridleys, and 1 green) were observed taken. Three of the 18 loggerhead incidents involved turtles that were likely dead prior to being taken by the dredge, and thus, were not counted toward the ITS. The green sea turtle take met the level of anticipated take in the ITS. Given that the authorized take level was not exceeded and the actual turtle takes corresponded to the anticipated take amount (as determined from the amount of material to be dredged as stated by the ACOE), consultation was not reinitiated. However, associated relocation trawling in these channels took a live green sea turtle and a fresh dead Kemp's ridley sea turtle, as well as other live loggerhead turtles. The potential for sea turtles to be killed during relocation trawling was not considered in the previous biological opinion, nor were green sea turtles anticipated to be taken in the trawl. These takes represent new information on the effects of the action that may affect listed species in a manner or to an extent not previously considered in the January 2002 BO. As such, the NOAA Fisheries and the ACOE communicated on the need to reinitiate section 7 consultation for this maintenance dredging.

In letters dated January 15 and February 6, 2003, the ACOE transmitted information on the 2002 dredging project and requested reinitiation of consultation, respectively. On March 7, 2003, NOAA Fisheries concurred with the ACOE's request to reinitiate section 7 consultation, and recognized the need to determine if a different incidental take level or other measures are warranted and modify the Incidental Take Statement and other portions of the Biological Opinion as appropriate. NOAA Fisheries further stated that the ACOE must not make any irreversible or irretrievable commitment of resources that would prevent NOAA Fisheries from proposing or implementing any reasonable and prudent alternatives to avoid jeopardizing endangered and threatened species. February 6, 2003 (the date of ACOE's letter) was used at the date of reinitiation of consultation.

DESCRIPTION OF THE PROPOSED ACTION

The ACOE proposes to continue the maintenance dredging of the Cape Henry, York Spit, York River Entrance and the Rappahannock Shoal Channels, all of which are in the Virginia waters of the Chesapeake Bay. The Cape Henry, York Spit, and Rappahannock Shoal Channels are three of the Baltimore Harbor Channels in the southern reaches of the Chesapeake Bay, under the management of the ACOE Baltimore District, while the York River Entrance Channel is managed by the ACOE Norfolk District. Hopper dredges will be used in these maintenance dredging projects.

Cape Henry Channel is 1,000 feet wide and approximately 3 miles long between the -50 foot contours at the entrance to the Chesapeake Bay. Maintenance dredging consists of removing shoaled sediments from the Cape Henry Channel to a depth of -54 feet mean lower low water (MLLW), including allowable overdepth. Over the past nine years, Cape Henry Chanel has been maintained five times, removing between 0.5 and 1.5 million cy of material per dredging event.

Normal maintenance dredging operations are expected to require 80 to 100 days, continuing 24 hours a day, for completion. Episodes of maintenance dredging are likely to be required only once every two to three years. Dredged material disposal for all Cape Henry Channel maintenance dredging occurs at the Dam Neck Dredged Material Management Area offshore Virginia Beach, Virginia in the Atlantic Ocean. The Dam Neck site was designated by the Environmental Protection Agency (EPA) on March 31, 1998 (53 FR 10382) and covers 9 square miles with an average depth of 40 feet.

York Spit Channel is 800 feet wide and approximately 18.3 miles long between the -50 foot contours north of the Chesapeake Bay Bridge Tunnel. Maintenance dredging consists of removing shoaled sediments to a depth of -52 feet. All dredged material disposal occurs at the Wolf Trap Alternate Placement Site in the Chesapeake Bay. Typical dredging operations are expected to require 15 to 25 days, continuing for 24 hours, for completion. Maintenance dredging is expected to occur every two to seven years. Over the past nine years, York Spit Channel was maintained three times, removing from approximately 250,000 to 1.1 million cy per dredging event.

The York River flows southeasterly into the lower Chesapeake Bay, between and parallel to the James and Pinkatank Rivers. The York is a tidal river, 34 miles in length, and includes a maintained navigable channel. The ACOE deepened and widened the natural entrance channel to the York in 1952 to serve the National Defense needs of the U.S. Navy. The ACOE dredged this channel again in 1998-1999 as a Civil Works project, thus maintaining the approximately 11 mile long channel from the 39 foot contour of the Chesapeake Bay to a point about 4 miles east of the mouth of the York River. Maintenance dredging of the York River Entrance is anticipated to maintain the channel at 37 feet deep by 750 feet wide, and all disposal of the dredge material would be in the Wolf Trap Alterative Placement Area north of the channel. The amount of material to be removed from York River Entrance Channel during maintenance dredging is approximately 1 million cy every 5 years.

The Rappahannock Shoal is 800 feet wide and approximately 50 feet deep. The 10.3 mile long channel traverses the Rappahannock Shoal from southeast to northwest. This channel does not typically require large amounts of maintenance dredging and a specific schedule for future dredging events has not been developed. The largest maintenance dredging event in this channel occurred in 1988 with the removal of 7800 cy of material.

Action Area

The action area for this consultation includes several areas in the Virginia waters of the Chesapeake Bay. Specific project actions will take place in the Cape Henry Channel, York Spit Channel, York River Entrance Channel and the Rappahannock Shoal Channel (Appendix A). Disposal of dredged material will occur in the Wolf Trap Alternative Placement Area and the Dam Neck Ocean Management Area (Appendix B). The action area for this consultation includes all of the aforementioned sites and the waters between and immediately adjacent to these areas.

STATUS OF AFFECTED SPECIES

NOAA Fisheries has determined that the action being considered in this biological opinion may affect the following endangered or threatened species under NOAA Fisheries' jurisdiction:

Cetaceans	
Right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Sea Turtles	
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempi*)	Endangered
Green sea turtle (*Chelonia mydas*[1])	Endangered/Threatened
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered

This section will focus on the status of the various species within the action area, summarizing information necessary to establish the environmental baseline and to assess the effects of the proposed action. Background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents including recent shortnose sturgeon (NOAA Fisheries 1996) and sea turtle (NOAA Fisheries and USFWS 1995, USFWS 1997, TEWG 2000, NOAA Fisheries SEFSC 2001) status reviews and stock assessments, Recovery Plans for the humpback whale (NOAA Fisheries 1991a), right whale (NOAA Fisheries 1991b), fin and sei whale (NOAA Fisheries 1998a), shortnose sturgeon (NOAA Fisheries 1998b), loggerhead sea turtle (NOAA Fisheries and USFWS 1991) and leatherback sea turtle (NOAA Fisheries and USFWS 1992), and the 1998 marine mammal stock assessment report (Waring et al. 1999).

Right Whale

While NOAA Fisheries recognizes three major subgroups of right whales, the North Atlantic subpopulation of right whales occurs in the action area. Right whales are present in the Northeast Shelf Ecosystem throughout most months of the year, but are most abundant in nearshore waters between February and June, with concentrations observed in the critical habitat areas. On June 3, 1994, NOAA Fisheries designated three areas off the East Coast as right whale critical habitat (59 FR 28793); none of these areas overlap the action area for this consultation. However, the species uses mid-Atlantic waters as a migratory pathway from the winter calving grounds off the coast of Florida to spring and summer nursery/feeding areas in the Gulf of Maine.

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[1] Pursuant to NOAA Fisheries regulations at 50 CFR 227.71, the prohibitions of Section 9 of the Endangered Species Act apply to all green turtles, whether endangered or threatened.

While it is not possible to obtain an exact count of the number of western North Atlantic right whales, IWC participants from a 1999 workshop agreed that it is reasonable to state that the current number of western North Atlantic right whales is probably around 300 (+/- 10%) (IWC 2001). This conclusion was based, in large part, on a photo-id catalog comprising more than 14,000 photographed sightings of 396 individuals, 11 of which were known to be dead and 87 of which had not been seen in more than 6 years. In addition, it was noted that relatively few new non-calf whales (whales that were never sighted and counted in the population as calves) had been sighted in recent years (IWC 2001) suggesting that the 396 individuals is a close approximation of the entire population. Since the 1999 IWC workshop there have been at least 53 right whale births; 1 in 2000, 31 in 2001, and 21 in 2002. In addition, one animal was "resurrected" meaning that it was seen after an absence of at least 6 years. However, at least four of the calves are known to be dead and a fifth was not resighted with its mother on the summer foraging grounds. Three adult right whales are known to have died and two are suspected of having died since the 1999 IWC workshop. Although the "count" of right whales based on the original count of 396 individually identified whales, the number of observed right whale births and the known and presumed mortalities equals 342 animals, for the purposes of this Opinion, NOAA Fisheries considers the best approximation for the number of North Atlantic right whales to be approximately 300 +/- 10% given that all mortalities are not known.

The sightings data and genetics data also support the conclusion that, as found previously, calving intervals have increased (from 3.67 years in 1992 to 5.8 years in 1998) and the survival rate has declined (IWC 2001). Even more alarming, the mortality of mature, reproductive females has increased, causing declines in population growth rate, life expectancy and the mean lifetime number of reproductive events between the period 1980-1995 (Fujiwara and Caswell 2001). In addition, for reasons which are unknown, many (presumed) mature females are not yet known to have given birth (an estimated 70% of mature females are reproductively active). Simply put, the western North Atlantic right whale population is declining because the trend over the last several years has been a decline in births coupled with an increase in mortality.

Anthropogenic impacts

The major known sources of anthropogenic mortality and injury of right whales include entanglement in commercial fishing gear and ship strikes. Right whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities.

Based on photographs of catalogued animals from 1959 and 1989, Kraus (1990) estimated that 57% of right whales exhibited scars from entanglement and 7% from ship strikes (propeller injuries). Using data from 1935 through 1995, Hamilton et al. (1998) found that an estimated 61.6% of right whales exhibit injuries caused by entanglement, and 6.4% exhibit signs of injury from vessel strikes. In addition, several animals have apparently been entangled on more than one occasion. Some right whales that have been entangled were subsequently involved in ship strikes. These scarring percentages are primarily based on sightings of free-swimming animals that initially survive the impact, which resulted in the scar. Because some animals may drown or be killed immediately, the actual number of interactions may be slightly higher.

Anthropogenic mortality in the form of ship strikes and fishing gear entanglements do, however, appear to be affecting the status of western North Atlantic right whales. Data collected from 1970 through 1999 indicate that anthropogenic interactions are responsible for a minimum of two-thirds of the confirmed and possible mortality of non-neonate animals (Knowlton and Kraus 2001). Of the 45 right whale mortalities documented during this period, 16 were due to ship collisions and three were due to entanglement in fishing gear (there were also 13 neonate deaths and 13 deaths of non-calf animals from unknown causes) (Knowlton and Kraus 2001). Based on the criteria developed by Knowlton and Kraus (2001), 56 additional serious injuries and mortalities from entanglement or ship strikes are believed to have occurred between 1970 and 1999: 9 from ship strikes and 28 from entanglement. Nineteen were considered to be fatal interactions (16 ship strikes, 3 entanglements). Ten were possibly fatal (2 ship strikes, 8 entanglements), and 27 were non-fatal (7 ship strikes, 20 entanglements) (Knowlton and Kraus 2001). Scarification analysis also provides information on the number of right whales which have survived ship strikes and fishing gear entanglements. Based on photographs of catalogued animals from 1959 and 1989, Kraus (1990) estimated that 57 percent of right whales exhibited scars from entanglement and 7 percent from ship strikes (propeller injuries). This work was updated by Hamilton *et al.* (1998) using data from 1935 through 1995. The new study estimated that 61.6 percent of right whales exhibit injuries caused by entanglement, and 6.4 percent exhibit signs of injury from vessel strikes. In addition, several whales have apparently been entangled on more than one occasion. Some right whales that have been entangled were subsequently involved in ship strikes. Because some animals may drown or be killed immediately, the actual number of interactions is expected to be higher. Eight new right whale entanglements and six right whale mortalities were observed in calendar year 2002, and one new entanglement has been observed in 2003 as of March 11, 2003.

Based on recent reviews of the status of the right whales, their reproductive rate (the number of calves that are born in the population each year) appears to be declining, which could increase the whales' extinction risk (Caswell *et al.* 1999, Fujiwara and Caswell 2001, IWC 2001). Based on the best available data on the right whales' population estimate and population trend, the western North Atlantic subpopulation of right whales is declining based on a combination of a low, estimated population size, increased mortality rate (particularly among adult, female whales), and decreased reproductive rate.

Humpback Whale

Humpback whales calve and mate in the West Indies and migrate to feeding areas in the northwestern Atlantic during the summer months. Six separate feeding areas are utilized in northern waters after their return (Waring et al. 1999). They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for the associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz 1999).

Humpback whales use the mid-Atlantic as a migratory pathway, but it may also be an important feeding area for juveniles. Since 1989, observations of juvenile humpbacks in the mid-Atlantic have been increasing during the winter months, peaking from January through March (Swingle

et al. 1993). Biologists theorize that non-reproductive animals may be establishing a winter feeding range in the mid-Atlantic since they are not participating in reproductive behavior in the Caribbean. Swingle et al. (1993) identified a shift in distribution of juvenile humpback whales in the nearshore waters of Virginia, primarily in winter months. Identified whales using the Mid-Atlantic area were found to be residents of the Gulf of Maine and Atlantic Canada (Gulf of St. Lawrence and Newfoundland) feeding groups, suggesting a mixing of different feeding populations in the Mid-Atlantic region. Strandings of humpback whales have increased between New Jersey and Florida since 1985 consistent with the increase in Mid-Atlantic whale sightings. Strandings were most frequent during September through April in North Carolina and Virginia waters, and were composed primarily of juvenile humpback whales of no more than 11 meters in length (Wiley *et al.* 1995).

It is not possible to provide a reliable estimate of abundance for the Gulf of Maine humpback whale feeding group at this time (Waring *et al.* 2000). Available data are too limited to yield a precise estimate, and additional data from the northern Gulf of Maine and perhaps elsewhere are required (Waring *et al.* 2000). Photographic mark-recapture analyses from the Years of the North Atlantic Humpback (YONAH) project gave an ocean-basin-wide estimate of 10,600 (95% c.i. = 9,300 - 12,100) (Waring *et al.* 2000). For management purposes under the MMPA, the estimate of 10,600 is regarded as the best available estimate for the North Atlantic population (Waring *et al.* 2000). Modeling using data obtained from photographic mark-recapture studies estimates the growth rate of the Gulf of Maine feeding population at 6.5% (Barlow and Clapham 1997). With respect to the species overall, there are also indications of increasing abundance for the eastern and central North Pacific stocks. However, trend and abundance data is lacking for the western North Pacific stock, the Southern Hemisphere humpback whales, and the Southern Indian Ocean humpbacks. Given the best available information, changes in status of the North Atlantic humpback population are, therefore, likely to affect the overall survival and recovery of the species.

Anthropogenic impacts

The major known sources of anthropogenic mortality and injury of humpback whales include entanglement in commercial fishing gear and ship strikes. Sixty percent of Mid-Atlantic humpback whale mortalities that were closely investigated showed signs of entanglement or vessel collision (Wiley *et al.* 1995). Between 1992 and 2002 at least 103 humpback whale entanglements and 10 ship strikes (this includes an interaction between a humpback whale and a 33' pleasure boat) were recorded. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined. The disentanglement program help to alleviate some of the affects of gear entanglements but cannot remove the risk of injury and death for entangled whales. For example, of the 11 humpback whales observed entangled in 2002, six were disentangled and gear was shed by one other. However, one of the disentangled animals was found dead just days later. Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48 percent --- and possibly as many as 78 percent --- of animals in the Gulf of Maine exhibit scarring caused by entanglement. These estimates are based on sightings of free-swimming

animals that initially survive the encounter. Because some whales may drown immediately, the actual number of interactions may be higher.

Humpback whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities including the operation of commercial fisheries.

Fin Whale

The fin whale is ubiquitous in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the arctic ice pack (NOAA Fisheries 1998a). Fin whales may be found throughout the action area for this consultation in most months of the year. The overall pattern of fin whale movement is complex, consisting of a less obvious north-south pattern of migration than that of right and humpback whales. Based on acoustic recordings from hydrophone arrays, however, Clark (1995) reported a general southward flow pattern of fin whales in the fall from the Labrador/Newfoundland region, south past Bermuda, and into the West Indes. The overall distribution may be based on prey availability and this species preys opportunistically on both invertebrates and fish (Watkins et al. 1984). As with humpback whales, they feed by filtering large volumes of water for the associated prey. Fin whales are larger and faster than humpback and right whales and are less concentrated in nearshore environments.

Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. One method used the catch history and trends in Catch Per Unit Effort to obtain an estimate of 3,590 to 6,300 fin whales for the entire western North Atlantic (Perry *et al.* 1999). Hain *et al.* (1992) estimated that about 5,000 fin whales inhabit the Northeastern United States continental shelf waters. The 2001 Stock Assessment Report (SAR) gives a best estimate of abundance for fin whales of 2,814 (CV = 0.21). The minimum population estimate for the western North Atlantic fin whale is 2,362 (Waring *et al.* 2001). However, this is considered an underestimate since the estimate derives from surveys over a limited portion of the western North Atlantic.

Anthropogenic impacts

The major known sources of anthropogenic mortality and injury of fin whales include entanglement in commercial fishing gear and ship strikes. Of 18 fin whale mortality records collected between 1991 and 1995, four were associated with vessel interactions, although the proximal cause of mortality was not known. From 1996-July 2001, there were nine observed fin whale entanglements and at least four ship strikes. It is believed to be the most commonly struck cetacean by large vessels (Laist *et al.* 2001). Fin whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities.

Loggerhead Sea Turtle

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans in a wide range of habitats. These include open ocean, continental

shelves, bays, lagoons, and estuaries (NOAA Fisheries and USFWS, 1995). It is the most abundant species of sea turtle in U.S. waters, commonly occurring throughout the inner continental shelf from Florida through Cape Cod, Massachusetts. NOAA Fisheries Northeast Fisheries Science Center survey data (1999) has found that loggerheads may occur as far north as Nova Scotia when oceanographic and prey conditions are favorable. The loggerhead sea turtle was listed as threatened under the ESA on July 28, 1978, but is considered endangered by the World Conservation Union (IUCN).

Loggerhead sea turtles are generally grouped by their nesting locations. Nesting is concentrated in the north and south temperate zones and subtropics. Loggerheads generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (Magnuson et al. 1990). The largest known nesting aggregations of loggerhead sea turtles occurs on Masirah and Kuria Muria Islands in Oman (Ross and Barwani 1982). However, the status of the Oman nesting beaches has not been evaluated recently, and their location in a part of the world that is vulnerable to extremely disruptive events (e.g. political upheavals, wars, and catastrophic oil spills) is cause for considerable concern (Meylan et al. 1995). The southeastern U.S. nesting aggregation is the second largest and represents about 35 percent of the nests of this species. From a global perspective, this U.S. nesting aggregations is, therefore, critical to the survival of this species.

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. In 1996, the Turtle Expert Working Group (TEWG) met on several occasions and produced a report assessing the status of the loggerhead sea turtle population in the western North Atlantic. Based on analysis of mitochondrial DNA, which the turtle inherits from its mother, the TEWG theorized that nesting assemblages represent distinct genetic entities, and that there are at least four loggerhead subpopulations in the western North Atlantic separated at the nesting beach (TEWG 1998, 2000). A fifth subpopulation was identified in NOAA Fisheries SEFSC 2001. The subpopulations are divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida, about 29° N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29° N on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990; approximately 1,000 nests in 1998); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (approximately 200 nests per year). Natal homing to the nesting beach is believed to provide the genetic barrier between these nesting aggregations, preventing recolonization from turtles from other nesting beaches. In addition, recent fine-scale analysis of mtDNA work from Florida rookeries indicate that population separations begin to appear between nesting beaches separated by more than 50-100 km of coastline that does not host nesting (Francisco et al. 1999) and tagging studies are consistent with this result (Richardson 1982, Ehrhart 1979, LeBuff 1990, CMTTP: in NOAA Fisheries SEFSC 2001). Nest site relocations greater than 100 km occur, but

are rare (Ehrhart 1979; LeBuff 1974, 1990; CMTTP; Bjorndal et at. 1983: in NOAA Fisheries SEFSC 2001).

Although NOAA Fisheries has not formally recognized subpopulations of loggerhead sea turtles under the ESA, based on the most recent reviews of the best scientific and commercial data on the population genetics of loggerhead sea turtles and analyses of their population trends (TEWG, 1998; TEWG 2000), NOAA Fisheries treats the loggerhead turtle nesting aggregations as nesting subpopulations whose survival and recovery is critical to the survival and recovery of the species. Any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will treat the five nesting aggregations of loggerhead sea turtles as subpopulations (which occur in the action area) for the purposes of this analysis.

The loggerhead sea turtles in the action area of this consultation likely represent turtles that have hatched from any of the five western Atlantic nesting sites, but are probably composed primarily of turtles that hatched from the northern nesting group and the south Florida nesting group. Although genetic studies of benthic immature loggerheads on the foraging grounds have shown the foraging areas to be comprised of a mix of individuals from different nesting areas, there appears to be a preponderance of individuals from a particular nesting area in some foraging locations. In general, south Florida turtles are more prevalent on southern foraging grounds and their concentrations decline to the north. Conversely, loggerhead turtles from the northern nesting group are more prevalent on northern foraging grounds and less so in southern foraging areas (Table 1; NOAA Fisheries SEFSC 2001; Bass et al. 1998).

Table 1. Contribution of loggerhead subpopulations to foraging grounds

SUBPOPULATION[a]	% CONTRIBUTION TO FORAGING GROUND				
	Western Gulf	Florida	Georgia	Carolinas	North of Cape Hatteras/Virginia[b]
South Florida	83%	73%	73%	65-66%	46%
Northern	10%	20%	24%	25-28%	46%
Yucatán	6-9%	6-9%	3%	6-9%	6-9%

[a] - The Florida Panhandle population was not included because it contributes less than 1% in the overall nesting effort and including it could result in overestimating its contribution.

[b] - Virginia was the most northern area sampled for the study (Bass *et al.* 1998)

Mixing trends have been found for loggerheads in pelagic waters. In the Mediterranean Sea, about 45 - 47 percent of the pelagic loggerheads can be traced to the South Florida subpopulation and about 2 percent are from the northern subpopulation, while only about 51 percent originated from Mediterranean nesting beaches (Laurent et al., 1998). In the vicinity of the Azores and Madiera Archipelagoes, about 19 percent of the pelagic loggerheads are from the northern

subpopulation, about 71 percent are from the South Florida subpopulation, and about 11 percent are from the Yucatán subpopulation (Bolten et al., 1998).

Further testing of loggerhead turtles from foraging areas north of Virginia is needed to assess the proportion of northern subpopulation turtles that occur on northern foraging grounds. A recent analysis (Rankin-Baransky *et al.*, 2001) of 79 loggerhead sea turtles that stranded from Virginia to Massachusetts determined that the turtles originated from three nesting areas; the northeast Florida/North Carolina (25% ± 10%), south Florida (59% ± 14%), and Quintana Roo, Mexico (16% ± 7%) (Rankin-Baransky *et al.*, 2001). However, these results should be reviewed with caution given that the majority (51) of the sampled turtles were obtained from the most northern point of the study (Barnstable County, Massachusetts). Nonetheless, they do provide new information on the complexity of loggerhead movements from the various nesting areas and suggest that the number of loggerhead turtles originating from the northern and south Florida subpopulations does not vary proportionally along the coast.

The role of males from the northern subpopulation also needs further investigation. Unlike the much larger south Florida subpopulation which produces predominantly females (80%), the northern subpopulation produces predominantly males (65%; NOAA Fisheries SEFSC 2001). New results from nuclear DNA analyses indicate that males do not show the same degree of site fidelity as do females. It is possible then that the high proportion of males produced in the northern subpopulation are an important source of males throughout the southeast U.S., lending even more significance to the critical nature of this small subpopulation (NOAA Fisheries SEFSC 2001).

Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years before settling into benthic environments. Turtles in this life history stage are called "pelagic immatures" and are best known from the eastern Atlantic near the Azores and Madeira and have been reported from the Mediterranean as well as the eastern Caribbean (Bjorndal et al., in press). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length (SCL) they move to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico. However, recent studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic immatures, followed by permanent settlement into benthic environments. Some may not totally circumnavigate the north Atlantic before moving to benthic habitats, while others may either remain in the pelagic habitat longer than hypothesized or move back and forth between pelagic and coastal habitats (Witzell in prep.).

Benthic immatures have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico (R. Márquez-M., pers. comm.). Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder et al., 1998) along the south and western coasts of Florida as compared with the rest of the coast, but it is not known whether the larger animals are actually more abundant in these areas or just more abundant within the area relative to the smaller turtles. Given an estimated age at maturity of 17-35 years (Frazer and Ehrhart 1985; B. Schroeder, pers.

comm.), the benthic immature stage must be at least 10-25 years long. As discussed in the beginning of this section, adult loggerheads nest primarily from North Carolina southward to Florida with additional nesting assemblages in the Florida Panhandle and on the Yucatán Peninsula. Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. NOAA Fisheries SEFSC (2001) analyses conclude that juvenile stages have the highest elasticity and maintaining or decreasing current sources of mortality in those stages will have the greatest impact on maintaining or increasing population growth rates.

Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998). Like other sea turtles, the movements of loggerheads are influenced by water temperature. Since they are limited by water temperatures, loggerhead sea turtles do not usually appear on the northern summer foraging grounds (e.g., in the action area) until June, but can be found in Virginia as early as April. The large majority leave the Gulf of Maine by mid-September but may remain in the Northeast and mid-Atlantic waters until as late as November or December (Epperly et al., 1995; Keinath 1993; Morreale 1999; Shoop and Kenney 1992). Aerial surveys of loggerhead turtles north of Cape Hatteras indicate that they are most common in waters from 22 to 49 m deep, although they range from the beach to waters beyond the continental shelf (Shoop and Kenney 1992). There is limited information regarding the activity of these offshore turtles. Loggerhead sea turtles are primarily benthic feeders, opportunistically foraging on crustaceans and mollusks (Wynne and Schwartz, 1999). Under certain conditions they may also scavenge fish, particularly if they are easy to catch (e.g., caught in nets; NOAA Fisheries and USFWS, 1991).

Status and trend of loggerhead sea turtles

Based on the data available, it is difficult to estimate the size of the loggerhead sea turtle population in the U.S. or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the U.S. from 1989-1998 represent the best dataset available to index the population size of loggerhead sea turtles. However, an important caveat for population trends analysis based on nesting beach data is that this may reflect trends in adult nesting females, but it may not reflect overall population growth rates. Given this, between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182 annually, with a mean of 73,751. Since a female often lays multiple nests in any one season, the average adult female population of 44,780 was calculated using the equation [(nests/4.1) * 2.5]. These data provide an annual estimate of the number of nests laid per year while indirectly estimating both the number of females nesting in a particular year (based on an average of 4.1 nests per nesting female, Murphy and Hopkins (1984)) and of the number of adult females in the entire population (based on an average remigration interval of 2.5 years; Richardson et al., 1978)). On average, 90.7% of these nests were of the south Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8%

were from the Florida Panhandle nest sites. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation the turtles making these nests belong. Based on the above, there are only an estimated approximately 3,800 nesting females in the northern loggerhead subpopulation. The status of this northern population based on number of loggerhead nests, has been classified as stable, at best, or declining (TEWG 2000). Another consideration adding to the vulnerability of the northern subpopulation is that NOAA Fisheries scientists estimate, using genetics data from Texas, South Carolina, and North Carolina in combination with juvenile sex ratios from those states, that the northern subpopulation produces 65% males, while the south Florida subpopulation is estimated to produce 80% females (NOAA Fisheries SEFSC 2001, Part I).

Several published reports have presented the problems facing long-lived species that delay sexual maturity (Crouse et al., 1987, Crowder et al., 1994, Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high annual survival as juveniles through adults to ensure that enough juveniles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. This general rule applies to sea turtles, particularly loggerhead sea turtles, as the rule originated in studies of sea turtles (Crouse et al., 1987, Crowder et al., 1994, Crouse 1999). Crouse (1999) concluded that relatively small decreases in annual survival rates of both juvenile and adult loggerhead sea turtles will adversely affect large segments of the total loggerhead sea turtle population. The survival of hatchlings seems to have the least amount of influence on the survivorship of the species, but historically, the focus of sea turtle conservation has been involved with protecting the nesting beaches. While nesting beach protection and hatchling survival are important, recovery efforts and limited resources might be more effective by focusing on the protection of juvenile and adult sea turtles.

Threats to loggerheads' recovery

The five major subpopulations of loggerhead sea turtles in the northwest Atlantic — northern, south Florida, Florida panhandle, Yucatán, and Dry Tortugas — are all subject to fluctuations in the number of young produced annually because of human-related activities as well as natural phenomena. Loggerhead sea turtles face numerous threats from natural causes. For example, there is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November), and the loggerhead sea turtle nesting season (March to November). Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. Other sources of natural mortality include cold stunning and biotoxin exposure.

The diversity of the sea turtle's life history leaves them susceptible to many human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. On their nesting beaches in the U.S., adult female loggerheads as well as hatchlings are threatened with beach erosion, armoring, and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; predation by species such as exotic fire ants, raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), opossums

(*Didelphus virginiana*); and poaching. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merrit Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection and probably cause fluctuations in sea turtle nesting success. For example, Volusia County, Florida, allows motor vehicles to drive on sea turtle nesting beaches (the County has filed suit against the U.S. Fish and Wildlife Service to retain this right). Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are impacted by a completely different set of threats from human activities once they migrate to the ocean. Pelagic immature loggerhead sea turtles from these four subpopulations circumnavigate the North Atlantic over several years (Carr 1987, Bjorndal et al. 1994). During that period, they are exposed to a series of long-line fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean long-line fleet, a Spanish long-line fleet, and various fleets in the Mediterranean Sea (Aguilar et al., 1995, Bolten et al., 1994, Crouse 1999). Observer records indicate that an estimated 6,544 loggerheads were captured by the U.S. Atlantic tuna and swordfish longline fleet between 1992-1998, of which an estimated 43 were dead (Yeung et al. 2000). Logbooks and observer records indicated that loggerheads readily ingest hooks (Witzell 1999).

In waters off the coastal U.S., loggerhead sea turtles are exposed to a suite of fisheries in Federal and State waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries. For example, loggerhead sea turtles have been captured in fixed pound net gear in the Long Island Sound, in pound net gear and trawls in summer flounder and other finfish fisheries in the mid-Atlantic and Chesapeake Bay, and in gillnet fisheries (e.g., monkfish, spiny dogfish) in the mid-Atlantic and elsewhere. The take of sea turtles, including loggerheads, in shrimp fisheries off the Atlantic coast have been well documented. It has previously been observed that loggerhead turtle populations along the southeastern Atlantic coast declined where shrimp fishing was intense off the nesting beaches but, conversely, did not appear to be declining where nearshore shrimping effort was low or absent (Magnuson et al. 1990).

In addition to fishery interactions, loggerhead sea turtles also face other threats in the marine environment, including the following: oil and gas exploration, development, and transportation; marine pollution; underwater explosions; hopper dredging, offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching.

Leatherback Sea Turtle

The leatherback is the largest living turtle and ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NOAA Fisheries and USFWS 1995). Leatherback turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas) and are often found in association with jellyfish. These turtles are found throughout the action area of this consultation and, while predominantly pelagic, they occur annually in places such as Cape Cod Bay and Narragansett Bay during certain times of the year, particularly the fall.

Although leatherbacks are a long lived species (> 30 years), they mature at a younger age than loggerhead turtles, with an estimated age at sexual maturity of about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NOAA Fisheries SEFSC 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs will incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm curved carapace length (ccl), Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 cm ccl.

Nest counts are the only reliable population information available for leatherback turtles. Recent declines have been seen in the number of leatherbacks nesting worldwide (NOAA Fisheries and USFWS 1995). The 1995 status review notes that it is unclear whether this observation is due to natural fluctuations or whether the population is at serious risk. Globally, leatherback populations have been decimated worldwide. The population was estimated to number approximately 115,000 adult females in 1980 and only 34,500 by 1995 (Spotila et al. 1996). The decline can be attributed to many factors including fisheries as well as intense exploitation of the eggs (Ross, 1979). Spotila et al. (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. The Pacific population appears to be in a critical state of decline, now estimated to number less than 3,000 total adult and subadult animals (Spotila et al. 2000). The status of the Atlantic population is less clear. In 1996, it was reported to be stable, at best (Spotila et al. 1996), but numbers in the Western Atlantic at that writing were reported to be on the order of 18,800 nesting females. According to Spotila (pers. comm.), the Western Atlantic population numbered about 15,000 nesting females in 2000, whereas current estimates for the Caribbean (4,000) and the Eastern Atlantic (i.e., off Africa, numbering ~ 4,700) have remained consistent with numbers reported by Spotila et al. in 1996. With regard to repercussions of these observations for the U.S. leatherback populations in general, it is unknown whether they are stable, increasing, or declining, but it is certain that some nesting populations (e.g., St. John and St. Thomas, U.S. Virgin Islands) have been extirpated.

The nesting population of leatherback sea turtles in the Suriname-French Guiana trans-boundary region has been declining since 1992 (Chevalier and Girondot 1998). Poaching and fishing gear interactions are, once again, believed to be the major contributors to the decline of leatherbacks in the area (Chevalier *et al.* in press, Swinkels *et al.* in press). While Spotila et al.(1996) indicated that turtles may have been shifting their nesting from French Guiana to Suriname due to beach erosion, analyses show that the overall area trend in number of nests has been negative since 1987 at a rate of 15.0 -17.3 % per year (NOAA Fisheries SEFSC 2001). If turtles are not nesting elsewhere, it appears that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females. Tag return data emphasize the global nature of the leatherback and the link

between these South American nesters and animals found in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, VA. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN database).

Anthropogenic impacts

Anthropogenic impacts to the leatherback population are similar to those discussed above for the loggerhead sea turtle. However, of the Atlantic turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), and their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, and perhaps to the lightsticks used to attract target species in longline fisheries. Sea turtles entangled in fishing gear generally have a reduced ability to feed, dive, surface to breathe or perform any other behavior essential to survival (Balazs 1985). They may be more susceptible to boat strikes if forced to remain at the surface, and entangling lines can constrict blood flow resulting in tissue necrosis.

At a workshop held in the Northeast in 1998 to develop a management plan for leatherbacks, experts expressed the opinion that incidental takes in fisheries were likely higher than is being reported. From 1990-2000, 92 entangled leatherbacks in lines associated with trap/pot gear were reported from New York through Maine (Dwyer *et al.* 2002). Anecdotal accounts by fishermen suggest that they have many more encounters than are reported. Entanglement in other pot gear set for other species of shellfish and finfish in the action area has also been documented. Prescott (1988) reviewed stranding data for Cape Cod Bay and concluded that for those turtles where cause of death could be determined (the minority), entanglement is the leading cause of death followed by capture by trawl, cold stunning, or collision with boats. Leatherbacks have also been documented entangled in crab pot gear in the Virginia Chesapeake Bay (e.g., 3 instances in 2002 alone).

Leatherbacks are taken as bycatch in several fisheries including the pelagic longline, coastal trawl, anchored gillnet, and pelagic gillnet. For instance, according to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NOAA Fisheries SEFSC 2001). Leatherbacks are foul hooked by longline gear (*e.g.*, on the flipper or shoulder area) rather than mouth or throat hooked like loggerheads.

Kemp's Ridley Sea Turtle

The Kemp's ridley is the most endangered of the world's sea turtle species. Of the world's seven extant species of sea turtles, the Kemp's ridley has declined to the lowest population level. Kemp's ridleys nest primarily on Rancho Nuevo in Tamaulipas, Mexico, where nesting females emerge synchronously during the day to nest in aggregations known as arribadas. Most of the population of adult females nest in this single locality (Pritchard 1969).

Kemp's ridley nesting occurs from April through July each year. Little is known about mating but it is believed to occur at or before the nesting season in the vicinity of the nesting beach. Hatchlings emerge after 45-58 days. Once they leave the beach, neonates presumably enter the Gulf of Mexico where they feed on available sargassum and associated infauna or other epipelagic species (USFWS and NOAA Fisheries, 1992). Research conducted by Texas A&M University has resulted in the intentional live-capture of hundreds of Kemp's ridleys at Sabine Pass and the entrance to Galveston Bay. Between 1989 and 1993, 50 of the Kemp's ridleys captured were tracked (using satellite and radio telemetry) by biologists with the NOAA Fisheries Galveston Laboratory. The tracking study was designed to characterize sea turtle habitat and to identify small and large scale migration patterns. Preliminary analysis of the data collected during these studies suggests that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud, NOAA Fisheries Galveston Laboratory, pers. comm.). Ogren (1988) suggests that the Gulf coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. However, at least some juveniles will travel northward as water temperatures warm to feed in productive coastal waters of Georgia through New England (USFWS and NOAA Fisheries, 1992).

Juvenile Kemp's ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic coastline as primary developmental habitat during summer months, with shallow coastal embayments serving as important foraging grounds. Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 40 cm in carapace length, and weighing less than 20 kg (Terwilliger and Musick 1995). Next to loggerheads, they are the second most abundant sea turtle in mid-Atlantic waters, arriving in these areas during late May and June (Keinath et al., 1987; Musick and Limpus, 1997). In the Chesapeake Bay, where the juvenile population of Kemp's ridley sea turtles was estimated to be 211 to 1,083 turtles (Musick and Limpus 1997), ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick 1985; Bellmund et al., 1987; Keinath et al., 1987; Musick and Limpus 1997). Other studies have found that post-pelagic ridleys feed primarily on crabs, consuming a variety of species. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997).

With the onset of winter and the decline of water temperatures, Kemp's ridleys migrate to more southerly waters from September to November (Keinath et al. 1987; Musick and Limpus 1997). Turtles that do not head south before water temperatures drop rapidly face the risk of cold-stunning. Although cold stunning can occur throughout the range of the species, cold stunning can be a significant natural cause of mortality for sea turtles in Cape Cod Bay and Long Island Sound. For example, in the winter of 1999/2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches ®. Prescott, pers. comm.). Annual cold stun events only occasionally occur at this magnitude; the extent of episodic major cold stun events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions and the occurrence of storm events in the late fall. Cold stunned turtles have also been reported on beaches in New York and New

Jersey (Morreale and Standora 1992). Although cold stun turtles can survive if found early enough, cold stunning events can represent a significant cause of natural mortality.

From telemetry studies, Morreale and Standora (1994) determined that Kemp's ridleys are sub-surface animals that frequently swim to the bottom while diving. The generalized dive profile showed that the turtles spend 56% of their time in the upper third of the water column, 12% in mid-water, and 32% on the bottom. In water shallower than 15 m (50 ft), the turtles dive to depth, but spend a considerable portion of their time in the upper portion of the water column. In contrast, turtles in deeper water dive to depth, spending as much as 50% of the dive on the bottom.

Status and trends of Kemp's ridley sea turtles

When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963), but the population has been drastically reduced from these historical numbers. However, the TEWG (1998; 2000) indicated that the Kemp's ridley population appears to be in the early stage of exponential expansion. Nesting data, estimated number of adults, and percentage of first time nesters have all increased from lows experienced in the 1970's and 1980's. From 1985 to 1999, the number of nests observed at Rancho Nuevo and nearby beaches has increased at a mean rate of 11.3% per year, allowing cautious optimism that the population is on its way to recovery. For example, data from nests at Rancho Nuevo, North Camp and South Camp, Mexico, have indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and 702 nests in 1985 then increased to produce 1,940 nests in 1995 and about 3,400 nests in 1999. Estimates of adult abundance followed a similar trend from an estimate of 9,600 in 1966 to 1,050 in 1985 and 3,000 in 1995. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6% to 28% from 1981 to 1989 and from 23% to 41% from 1990 to 1994.

The TEWG (1998) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are estimated to be 2-9 years of age and 20-60 cm in length. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the USFWS and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the introduction of TEDs.

The population model in the TEWG report projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. The TEWG (1998) identified an average Kemp's ridley population growth rate of 13% per year between 1991 and 1995. Total nest numbers have continued to increase. However, the 1996 and 1997 nest numbers reflected a slower rate of growth, while the increase in the 1998 nesting level has been much higher and decreased in 1999. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular internesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

One area for caution in the TEWG findings is that the area surveyed for ridley nests in Mexico was expanded in 1990 due to destruction of the primary nesting beach by Hurricane Gilbert. Because systematic surveys of the adjacent beaches were not conducted prior to 1990, there is no way to determine what proportion of the nesting increase documented since that time is due to the increased survey effort rather than an expanding ridley nesting range. The TEWG (1998) assumed that the observed increases in nesting, particularly since 1990, was a true increase rather than the result of expanded beach coverage. As noted by TEWG, trends in Kemp's ridley nesting even on the Rancho Nuevo beaches alone suggest that recovery of this population has begun but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp's Ridley Recovery Plan.

Threats to Kemp's ridleys' recovery

Like other turtle species, the severe decline in the Kemp's ridley population appears to have been heavily influenced by a combination of exploitation of eggs and impacts from fishery interactions. From the 1940's through the early 1960's, nests from Ranch Nuevo were heavily exploited (USFWS and NOAA Fisheries, 1992), but beach protection in 1966 helped to curtail this activity (USFWS and NOAA Fisheries, 1992). Currently, anthropogenic impacts to the Kemp's ridley population are similar to those discussed above for other sea turtle species. Sea sampling coverage in the Northeast otter trawl fishery, pelagic longline fishery, and southeast shrimp and summer flounder bottom trawl fisheries have recorded takes of Kemp's ridley turtles. Following World War II, there was a substantial increase in the number of trawl vessels, particularly shrimp trawlers, in the Gulf of Mexico where the adult Kemp's ridley turtles occur. Information from fishers helped to demonstrate the high number of turtles taken in these shrimp trawls (USFWS and NOAA Fisheries, 1992). Subsequently, NOAA Fisheries has worked with the industry to reduce turtle takes in shrimp trawls and other trawl fisheries, including the development and use of Turtle Excluder Devices (TEDs).

Kemp's ridleys may also be affected by large-mesh gillnet fisheries. In the spring of 2000, a total of five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 277 loggerhead carcasses were found. Cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The five ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were

killed or seriously injured as a result of the fishery interaction since it is unlikely that all of the carcasses washed ashore. It is possible that strandings of Kemp's ridley turtles in some years have increased at rates higher than the rate of increase in the Kemp's ridley population (TEWG 1998).

Green Sea Turtle

Green turtles are the largest chelonid (hard-shelled) sea turtle, with an average adult carapace of 91 cm SCL and weight of 150 kg. Ninety percent of green turtles found in Long Island Sound are between 25 and 40 cm SCL, with the largest reported being 68 cm (Burke et al. 1991). Based on growth rate studies of wild green turtles, greens have been found to grow slowly with an estimated age of sexual maturity ranging from 18 to 40 years (Balazs 1982, Frazer and Ehrhard 1985 in NOAA Fisheries and USFWS 1991a, B. Schroeder pers. comm.).

Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean (Wynne and Schwartz, 1999). As is the case for loggerhead and Kemp's ridley sea turtles, green sea turtles use mid-Atlantic and northern areas of the western Atlantic Ocean as important summer developmental habitat. Green turtles are found in estuarine and coastal waters as far north as Long Island Sound, Chesapeake Bay, and North Carolina sounds (Musick and Limpus 1997). Limited information is available regarding the occurrence of green turtles in the Chesapeake Bay, although they are presumably present in very low numbers. Like loggerheads and Kemp's ridleys, green sea turtles that use northern waters during the summer must return to warmer waters when water temperatures drop, or face the risk of cold stunning. Cold stunning of green turtles may occur in southern areas as well (i.e., Indian River, Florida), as these natural mortality events are dependent on water temperatures and not solely geographical location.

In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Occasional nesting has been documented along the Gulf coast of Florida, at southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan et al., 1995). Certain Florida nesting beaches where most green turtle nesting activity occurs have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan et al., 1995). Recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Recent population estimates for green turtles in the western Atlantic area are not available.

While nesting activity is obviously important in assessing population trends, the remaining portion of the green turtle's life is spent on the foraging and breeding grounds. Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed

to be omnivorous, but with a strong tendency toward carnivory during early life stages. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet (Bjorndal 1997). Green turtles appear to prefer marine grasses and algae in shallow bays, lagoons and reefs (Rebel 1974), but also consume jellyfish, salps, and sponges. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). The preferred food sources in these areas are *Cymodocea, Thalassia, Zostera, Sagittaria,* and *Vallisneria* (Carr 1952). In North Carolina, green turtles are known to occur in estuarine and oceanic waters and to nest in low numbers along the entire coast. The summer developmental habitat for green turtles also encompasses estuarine and coastal waters of Chesapeake Bay and as far north as Long Island Sound (Musick and Limpus 1997).

Threats to green turtles' recovery

In 1978, the green turtle was listed as threatened under the ESA, except for the breeding populations in Florida and on the Pacific coast of Mexico, which were listed as endangered (NOAA Fisheries and USFWS 1991a). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and directed fisheries in the United States and throughout the Caribbean are largely to blame for the decline of the species. In the Gulf of Mexico, green turtles were once abundant enough in the shallow bays and lagoons to support a commercial fishery. In 1890, over one million pounds of green turtles were taken in the Gulf of Mexico green sea turtle fishery (Doughty 1984). However, declines in the turtle fishery throughout the Gulf of Mexico were evident by 1902 (Doughty 1984).

Fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtle's body, has been found to infect green turtles, most commonly juveniles. The occurrence of fibropapilloma tumors, most frequently documented in Hawaiian green turtles, may result in impaired foraging, breathing, or swimming ability, leading potentially to death.

Green turtles continue to be heavily exploited by man, with the degradation of nesting and foraging habitats, incidental capture in fisheries, and marine pollution acknowledged as serious hindrances to species recovery. As with the other sea turtle species, fishery mortality accounts for a large proportion of annual anthropogenic mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of mortality. Sea sampling coverage in the pelagic driftnet, pelagic longline, scallop dredge, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. Stranding reports indicate that between 200-400 green turtles strand annually along the Eastern U.S. coast from a variety of causes, most of which are unknown (Sea Turtle Stranding and Salvage Network, unpublished data).

Hawksbill Sea Turtle

The hawksbill turtle is relatively uncommon in the waters of the continental United States. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. However, there are accounts of hawksbills in south Florida and a surprising number are encountered in Texas. Most of the Texas records report small turtles, probably in the 1-2 year class range. Many captures or strandings are of individuals in an unhealthy or injured condition (Hildebrand 1982). The lack of sponge-covered reefs and the cold winters in the northern Gulf of Mexico probably prevent hawksbills from establishing a viable population in this area. In the north Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (STSSN database). Many of these strandings were observed after hurricanes or offshore storms. Although there have been no reports of hawksbills in the Chesapeake Bay, one has been observed taken incidentally in a fishery just south of the Bay (Anonymous 1992).

Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include Puerto Rico and the Virgin Islands.

No takes of hawksbill sea turtles have been recorded in northeast or mid-Atlantic fisheries covered by the NEFSC observer program.

Shortnose Sturgeon

Shortnose sturgeon occur in large rivers along the western Atlantic coast from the St. Johns River, Florida (possibly extirpated from this system), to the Saint John River in New Brunswick, Canada. The species is anadromous in the southern portion of its range (i.e., south of Chesapeake Bay), while northern populations are amphidromous (NOAA Fisheries 1998b). Population sizes vary across the species' range. From available estimates, smallest populations occur in the Cape Fear (~8 adults; Moser and Ross 1995) and Merrimack Rivers (~100 adults; M. Kieffer, United States Geological Survey, personal communication), while the largest populations are found in the Saint John (~100,000; Dadswell 1979) and Hudson Rivers (~61,000; Bain et al. 1998).

Total instantaneous mortality rates (Z) are available for the Saint John River (0.12 - 0.15; ages 14-55; Dadswell 1979), Upper Connecticut River (0.12; Taubert 1980), and Pee Dee-Winyah River (0.08-0.12; Dadswell et al. 1984). Total instantaneous natural mortality (M) for shortnose sturgeon in the lower Connecticut River was estimated to be 0.13 (T. Savoy, Connecticut Department of Environmental Protection, personal communication). There is no recruitment information available for shortnose sturgeon because there are no commercial fisheries for the species. Estimates of annual egg production for this species are difficult to calculate because females do not spawn every year (Dadswell et al. 1984). Further, females may abort spawning attempts, possibly due to interrupted migrations or unsuitable environmental conditions (NOAA Fisheries 1998b). Thus, annual egg production is likely to vary greatly in this species.

Shortnose sturgeon are benthic fish that mainly occupy the deep channel sections of large rivers. They feed on a variety of benthic and epibenthic invertebrates including molluscs, crustaceans (amphipods, chironomids, isopods), and oligochaete worms (Vladykov and Greeley 1963; Dadswell 1979). Shortnose sturgeon are long-lived (30 years) and, particularly in the northern extent of their range, mature at late ages. In the north, males reach maturity at 5 to 10 years, while females mature between 7 and 13 years.

In the northern extent of their range, shortnose sturgeon exhibit three distinct movement patterns that are associated with spawning, feeding, and overwintering periods. In spring, as water temperatures rise above 8° C, pre-spawning shortnose sturgeon move from overwintering grounds to spawning areas. Spawning occurs from mid/late April to mid/late May. Post-spawned sturgeon migrate downstream to feed throughout the summer. As water temperatures drop below 8° C again in the fall, shortnose sturgeon move to overwintering concentration areas and exhibit little movement until water temperatures rise again in spring (Dadswell et al. 1984; NOAA Fisheries 1998b). Young-of-the-year shortnose sturgeon are believed to move downstream after hatching (Dovel 1981) but remain within freshwater habitats. Older juveniles tend to move downstream in fall and winter as water temperatures decline and the salt wedge recedes. Juveniles move upstream in spring and feed mostly in freshwater reaches during summer.

Shortnose sturgeon spawn in freshwater sections of rivers, typically below the first impassable barrier on the river (e.g., dam). Spawning occurs over channel habitats containing gravel, rubble, or rock-cobble substrates (Dadswell et al. 1984; NOAA Fisheries 1998b). Additional environmental conditions associated with spawning activity include decreasing river discharge following the peak spring freshet, water temperatures ranging from 9-12° C, and bottom water velocities of 0.4 to 0.7 m/sec (Dadswell et al. 1984; NOAA Fisheries 1998b).

Shortnose sturgeon historically occurred in the Chesapeake Bay, but prior to 1996, the best available information suggested that the species was either extirpated or very rare from the area. However, the presence of shortnose sturgeon in the Chesapeake Bay has recently been detected (Skjeveland et al. 2000) due to the initiation in 1996 of a U.S. Fish and Wildlife Service reward program for Atlantic sturgeon in Maryland waters of the Chesapeake Bay. Before the reward program, there were only 15 published historic records of shortnose sturgeon in the Chesapeake Bay, and most of these were based on personal observations from the upper Chesapeake Bay during the 1970s and 1980s (Dadswell et al. 1984). From 1996 to July 2002, approximately 50 sturgeon have been reported in Maryland waters. Most of the shortnose sturgeon were caught in waters in the upper Chesapeake Bay north of Hart-Miller Island (Skjeveland et al. 2000).

While in the Chesapeake Bay this species has been more frequently encountered in Maryland waters, shortnose sturgeon have historically been found as far south as the Rappahannock River (Skjeveland et al. 2000). From February through November 1997, a Fish and Wildlife Service reward program was in effect for Atlantic sturgeon in Virginia's major tributaries (James, York, and Rappahannock Rivers). A sturgeon captured from the Rappahannock River in May 1997 was confirmed as a shortnose sturgeon (Spells 1998). Nevertheless, distribution and movements of shortnose sturgeon in the Bay are poorly understood, in part because this species is often

confused with Atlantic sturgeon. No population estimates for shortnose sturgeon in the Chesapeake Bay area are available at this time.

Anthropogenic threats to shortnose sturgeon's recovery

The major known sources of anthropogenic mortality and injury of shortnose sturgeon include entrainment in dredges and entanglement in fishing gear. Injury and mortality can also occur at power plant cooling water intakes and structures associated with dams in rivers inhabited by this species. Shortnose sturgeon may also be adversely affected by habitat degradation or exclusion associated with riverine maintenance and construction activities and operation of power plants. Entanglement could include incidental catch in commercial or recreational gear as well as directed poaching activities. Shortnose sturgeon are most likely to interact with fisheries in and around the mouths of rivers where they are found. Thus, interactions are more likely to occur in state fisheries or unregulated fisheries than in the EEZ. Interactions are also most likely to occur during the spring migration (NOAA Fisheries 1998b). According to information summarized in NOAA Fisheries (1998b), operation of gillnet fisheries for shad may result in lethal takes of as many as 20 shortnose sturgeon per year in northern rivers. Shortnose sturgeon may be taken in ocean fisheries near rivers inhabited by this species. No comprehensive analysis of entanglement patterns is available at this time, in part due to the difficulty of distinguishing between shortnose and Atlantic sturgeon with the similarity in appearance of these two species. For example, several thousand pounds of "sturgeon" were reported taken in the squid/mackerel/butterfish fishery in 1992; however, this information is not broken down by species.

ENVIRONMENTAL BASELINE

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this biological opinion includes the effects of several activities that may affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation include vessel operations, fisheries, discharges, dredging, ocean dumping, sonic activities, and recovery activities associated with reducing those impacts.

Due to logistical difficulties associated with most marine activities and the significant amount of resources necessary to design effective monitoring programs, monitoring the effects of the various federal actions on threatened and endangered species has not been consistent for all species groups and all projects. For example, the most reliable method for monitoring fishery interactions is the sea sampling program, which provides random sampling of commercial fishing activities. However, due to the size, power, and mobility of whales, sea sampling is only effective for sea turtles and sturgeon. Although takes of whales are occasionally observed by the sea sampling program, levels of interaction between whales and fishing vessels and their gear is derived from data collected opportunistically. It is often impossible to assign gear found on stranded or free-swimming animals to a specific fishery. Consequently, the total level of interaction between fisheries and whales is unknown.

A. Federal Actions that have Undergone Formal or Early Section 7 Consultation

NOAA Fisheries has undertaken several ESA section 7 consultations to address the effects of vessel operations and gear associated with federally-permitted fisheries on threatened and endangered species in the action area. Each of those consultations sought to develop ways of reducing the probability of adverse impacts of the action on listed species. Similarly, recovery actions NOAA Fisheries has undertaken under both the Marine Mammal Protection Act (MMPA) and the ESA are addressing the problem of take of whales in the fishing and shipping industries.

Vessel Operations

Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the U.S. Navy (USN) and the U.S. Coast Guard (USCG), which maintain the largest federal vessel fleets, the EPA, the National Oceanic and Atmospheric Administration (NOAA), and the ACOE. NOAA Fisheries has conducted formal consultations with the USCG, the USN, and is currently in early phases of consultation with the other federal agencies on their vessel operations (e.g., NOAA research vessels). In addition to operation of ACOE vessels, NOAA Fisheries has consulted with the ACOE to provide recommended permit restrictions for operations of contract or private vessels around whales. Through the section 7 process, where applicable, NOAA Fisheries has and will continue to establish conservation measures for all these agency vessel operations to avoid adverse effects to listed species. At the present time, however, they represent some level of potential interaction. Refer to the biological opinions for the USCG (September 15, 1995; July 22, 1996; and June 8, 1998) and the USN (May 15, 1997) for detail on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

Federal Fishery Operations

Several commercial fisheries operating in the action area use gear which is known to take listed species. Efforts to reduce the adverse effects of commercial fisheries are addressed through both the MMPA take reduction planning process and the ESA section 7 process. Federally regulated gillnet, longline, trawl, seine, dredge, and pot fisheries have all been documented as interacting with either whales or sea turtles or both. Other gear types may impact whales and sea turtles as well. For all fisheries for which there is a federal fishery management plan (FMP) or for which any federal action is taken to manage that fishery, impacts have been evaluated through the section 7 process.

Formal ESA section 7 consultation has been conducted on the following fisheries which may adversely affect threatened and endangered species in the action area: Multispecies, Monkfish, Summer Flounder/Scup/Black Sea Bass, Atlantic Bluefish, Spiny Dogfish, Tilefish, Scallop and Red Crab fisheries. These consultations are summarized below.

The *Multispecies sink gillnet fishery* occurs in the action area and is known to entangle whales and sea turtles. This fishery has historically occurred along the northern portion of the Northeast Shelf Ecosystem from the periphery of the Gulf of Maine to Rhode Island in water depths to 60 fathoms. In recent years, more of the effort in this fishery has occurred in offshore waters and into the Mid-Atlantic. The fishery operates throughout the year with peaks in the spring and from October through February. NOAA Fisheries reinitiated consultation on the Multispecies FMP on May 4, 2000, in order to reevaluate the ability of the Reasonable and Prudent

Alternative (RPA) to avoid the likelihood of jeopardy to right whales. The BO, signed on June 14, 2001, concluded that continued implementation of the Multispecies FMP may adversely affect loggerhead, Kemp's ridley and green sea turtles and is likely to jeopardize the existence of the northern right whale. A new RPA was also included to avoid the likelihood that the operation of the gillnet sector of the multispecies fishery would result in jeopardy to northern right whales. The ITS exempted the lethal or non-lethal take of one loggerhead sea turtle, and one green, leatherback, or Kemp's ridley turtle annually.

The federal *Monkfish fishery* occurs in all waters under federal jurisdiction from Maine to the North Carolina/South Carolina border. The monkfish fishery uses several gear types that may entangle protected species. In 1999, observers documented that turtles were taken in excess of the ITS as a result of entanglements in monkfish gillnet gear. NOAA Fisheries reinitiated consultation on the Monkfish FMP on May 4, 2000, in part, to reevaluate the affect of the monkfish gillnet fishery on sea turtles. The Opinion also considered new information on the status of the northern right whale and new Atlantic Large Whale Take Reduction Plan (ALWTRP) measures, and the ability of the RPA to avoid the likelihood of jeopardy to right whales. The Opinion concluded that continued implementation of the Monkfish FMP was likely to jeopardize the existence of the northern right whale. A new RPA was provided that was expected to remove the threat of jeopardy to northern right whales. In addition, a new ITS was provided for the take of sea turtles in the fishery. However, consultation was once again reinitiated on the Monkfish FMP as of February 12, 2003, to consider the effects of Framework Adjustment 2 measures on ESA-listed species. This consultation was completed on April 14, 2003, and concluded that the proposed action is not likely to result in jeopardy to any ESA-listed species under NOAA Fisheries jurisdiction. However, takes of sea turtles are still expected to occur, which was reflected in the ITS. The ITS anticipated the take of 3 loggerheads and 1 non-loggerhead species (green, leatherback, or Kemp's ridley) in monkfish gillnet gear, and 1 sea turtle (loggerhead, green, leatherback, or Kemp's ridley) in monkfish trawl gear.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. Significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl by requiring the use of TEDs throughout the year for trawl nets fished from the North Carolina/South Carolina border to Oregon Inlet, NC, and seasonally (March 16-January 14) for trawl vessels fishing between Oregon Inlet, NC and Cape Charles, VA. Takes may still occur with this gear type in other areas however. Based on the occurrence of gillnet entanglements in other fisheries, the gillnet portion of this fishery could entangle endangered whales. The pot gear and staked trap sectors could also entangle whales and sea turtles. The most recent (December 16, 2001) formal consultation on this fishery concluded that the operation of the fishery may adversely affect but is not likely to jeopardize the continued existence of listed species. The ITS anticipated that 19 loggerhead or Kemp's ridley takes (up to 5 lethal) and 2 green turtle takes (lethal or non-lethal) may occur annually. However, as a result of new information not considered in previous consultations, NOAA Fisheries has recently reinitiated section 7 consultation on this FMP to consider the effects of the fisheries on ESA-listed whales and sea turtles.

The *Atlantic Bluefish fishery* may pose a risk to protected marine mammals, but is most likely to interact with sea turtles (primarily Kemp's ridleys and loggerheads) given the time and locations where the fishery occurs. Gillnets are the primary gear used to commercially land bluefish.

Whales and turtles can become entangled in the buoy lines of the gillnets or in the net panels. Formal consultation this fishery was completed on July 2, 1999, and NOAA Fisheries concluded that operation of the fishery under the FMP, as amended, is not likely to jeopardize the continued existence of listed species. The ITS exempted the annual take 6 loggerheads (no more than 3dead), 6 Kemp's ridleys (dead or alive), and 1shortnose sturgeon. Although there is a high degree of overlap between the bluefish fishery and other regulated fisheries, observer data suggests that takes of sea turtles may be occurring in unregulated fisheries that also harvest bluefish. Takes by vessels harvesting bluefish while fishing for unregulated species have not been previously addressed under the section 7 process.

The primary gear types for the *Spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear. Sea turtles can be incidentally captured in all gear sectors of this fishery. Turtle takes in 2000 included one dead and one live Kemp's ridley. Since the ITS issued with the August 13, 1999, Opinion anticipated the take of only one Kemp's ridley (lethally or non-lethally), the incidental take level for the dogfish FMP was exceeded. In addition, a right whale mortality occurred in 1999 as a result of entanglement in gillnet gear that may (but was not determined to be) have originated from the spiny dogfish fishery. NOAA Fisheries, therefore, reinitiated consultation on the Spiny Dogfish FMP on May 4, 2000, in order to reevaluate the ability of the RPA to avoid the likelihood of jeopardy to right whales, and the effect of the spiny dogfish gillnet fishery on sea turtles. The Opinion also considered new information on the status of the northern right whale and new ALWTRP measures. The Opinion, signed on June 14, 2001, concluded that continued implementation of the Spiny Dogfish FMP is likely to jeopardize the existence of the northern right whale. A new RPA was provided that was expected to remove the threat of jeopardy to northern right whales as a result of the gillnet sector of the spiny dogfish fishery. In addition, the ITS anticipated the annual take of 3 loggerheads (no more than 2 lethal), 1 green (lethal or non-lethal), 1 leatherback (lethal or non-lethal), or 1 Kemp's ridley (lethal or non-lethal).

The FMP for spiny dogfish calls for a 30% reduction in quota allocation levels for 2000 and a 90% reduction beginning in 2001. Although there have been delays in implementing the plan, quota allocations are expected to be substantially reduced over the 4 ½ year rebuilding schedule, which should result in a substantial decrease in effort directed at spiny dogfish. For the last four years of the rebuilding period, dogfish landings are likely to be limited to incidental catch in other fisheries. The reduction in effort should be of benefit to protected species by reducing the number of gear interactions that occur.

The management unit for the *Tilefish* FMP is all golden tilefish under U.S. jurisdiction in the Atlantic Ocean north of the Virginia/North Carolina border. Tilefish have some unique habitat characteristics, and are found in a warm water band (47-65° F) at approximately 250 to 1200 feet deep on the outer continental shelf and upper slope of the U.S. Atlantic coast. Because of their restricted habitat and low biomass, the tilefish fishery in recent years has occurred in a relatively small area in the Mid-Atlantic Bight, south of New England and west of New Jersey. Section 7 consultation was completed on this newly regulated fishery in February 7, 2001. An incidental take statement was provided for loggerhead and leatherback sea turtles, anticipating the annual take of 6 loggerheads (up to3 lethal) and 1 leatherback (lethal or non-lethal).

It was previously believed that the *Scallop dredge fishery* was unlikely to take sea turtles given the slow speed and location at which the gear operates. However, 40 hard shelled turtles were observed or reported captured in the scallop dredge fishery from 1996 to October 2002. Most of these animals were captured in the Hudson Canyon Closed area, and 23 of 40 turtles were alive with no apparent injuries. Section 7 consultation was completed on this fishery, and the BO, dated February 24, 2003, concluded that the fishery was not likely to jeopardize listed species. The ITS anticipated the annual take of 88 loggerheads (up to 25 lethal), 7 Kemp's ridleys (up to 2 lethal), and 1 green turtle (lethal or non-lethal) in scallop dredge gear, and 1 loggerhead, Kemp's ridley, green or leatherback turtle (lethal or non-lethal) in scallop trawl gear. Additional observer coverage and research are underway to further quantify the takes in this fishery and explore gear technology solutions aimed at reducing turtle interactions.

The *Red crab fishery* is a pot/trap fishery that occurs in deep waters along the continental slope. There have been no recorded takes of ESA-listed species in the red crab fishery. However, given the type of gear used in the fishery, takes may be possible where gear overlaps with the distribution of ESA-listed species. Section 7 consultation was completed on the proposed implementation of the Red Crab FMP, and the BO, issued on February 6, 2002, concluded that the action is not likely to result in jeopardy to any ESA-listed species under NOAA Fisheries jurisdiction. Takes of loggerhead and leatherback sea turtles are considered unlikely but possible. As such, the ITS anticipated the annual take of 1 loggerhead and 1 leatherback sea turtle (lethal or non-lethal).

Other than entanglement in fishing gear, effects of *fishing vessels* on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. Listed species or critical habitat may also be affected by fuel oil spills resulting from fishing vessel accidents. No collisions between commercial fishing vessels and listed species or adverse effects resulting from disturbance have been documented. However, the commercial fishing fleet represents a significant portion of marine vessel activity. For example, more than 280 commercial fishing vessels fish on Stellwagen Bank in the Gulf of Maine. In addition, commercial fishing vessels may be the only vessels active in some areas, particularly in cooler seasons. Therefore, the potential for collisions exists. Due to differences in vessel speed, collisions during fishing activities are less likely than collisions during transit to and from fishing grounds. Because most fishing vessels are smaller than large commercial tankers and container ships, collisions are less likely to result in mortality. Although entanglement in fishing vessel anchor lines has been documented historically, no information is available on the prevalence of such events. Fuel oil spills could affect animals directly or indirectly through the food chain. Fuel spills involving fishing vessels are common events. However, these spills typically involve small amounts of material that are unlikely to adversely affect listed species. Larger spills may result from accidents, although these events would be rare and involve small areas. No direct adverse effects on listed species or critical habitat resulting from fishing vessel fuel spills have been documented. Given the current lack of information on prevalence or impacts of interactions, there is no basis to conclude that the level of interaction represented by any of the various fishing vessel activities discussed in this section would be detrimental to the recovery of listed species.

B. Non-Federally Regulated Actions

Private and Commercial Vessel Operations

Private and commercial vessels operate in the action area of this consultation and also have the potential to interact with whales and sea turtles. Ship strikes have been identified as a significant source of mortality to the northern right whale population (Kraus 1990) and are also known to impact all other endangered whales. A whale watch enterprise focusing on humpback whales has developed in the Virginia Capes area in the winter months. In addition, an unknown number of private recreational boaters frequent coastal waters; some of these are engaged in whale watching or sportfishing activities. These activities have the potential to result in lethal (through entanglement or boat strike) or non-lethal (through harassment) takes of listed species that could prevent or slow a species' recovery. Effects of harassment or disturbance which may be caused by whale watch operations are currently unknown. Shipping traffic in Massachusetts Bay is estimated at 1,200 ship crossings per year with an average of 3 per day. Sportfishing contributes more than 20 vessels per day from May to September on Stellwagen Bank in the Gulf of Maine. Information is not currently available on how comparable these figures are to the level of vessel activity in the action area. The advent of new technology resulting in high speed catamarans for ferry services and whale watch vessels operating in congested coastal areas contributes to the potential for impacts from privately-operated vessels in the environmental baseline. Recent federal efforts regarding mitigating impacts of the whale watch and shipping industries on endangered whales are discussed in Section D below.

In addition to commercial traffic and recreational pursuits, private vessels participate in high speed marine events concentrated in the southeastern U.S. that are a particular threat to sea turtles. The magnitude of these marine events in the action area is not currently known. The Sea Turtle Stranding and Salvage Network (STSSN) also reports regular incidents of likely vessel interactions (e.g., propeller-type injuries) with sea turtles. Interactions with these types of vessels and sea turtles could occur in the action area, and it is possible that these collisions would result in mortality.

Other than injuries and mortalities resulting from collisions, the effects of disturbance caused by vessel activity on listed species is largely unknown. Although the difficulty in interpreting animal behavior makes studying the effects of vessel activities problematic, attempts have been made to evaluate the impacts of vessel activities such as whale watch operations on whales in the Gulf of Maine. However, no conclusive detrimental effects have been demonstrated.

Non-Federally Regulated Fishery Operations

Very little is known about the level of take in fisheries that operate strictly in state waters. However, depending on the fishery in question, many state permit holders also hold federal licenses; therefore, section 7 consultations on federal actions in those fisheries address some state-water activity. Impacts on sea turtles and shortnose sturgeon from state fisheries may be greater than those from federal activities in certain areas due to the distribution of these species. Impacts of state fisheries on endangered whales are addressed as appropriate through the MMPA take reduction planning process. NOAA Fisheries is actively participating in a cooperative effort with the Atlantic States Marine Fisheries Commission (ASMFC) and member states to standardize and/or implement programs to collect information on level of effort and bycatch of protected species in state fisheries. When this information becomes available, it can be used to refine take reduction plan measures in state waters. Additionally, the June 2001 Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic Ocean and Gulf of Mexico Fisheries

will assess the fishery impacts to turtles on a gear based approach, so this initiative will also better quantify and attempt to minimize sea turtle takes in state water fisheries.

With regard to whale entanglements, vessel identification is occasionally recovered from gear removed from entangled animals. With this information, it is possible to determine whether the gear was deployed by a federal or state permit holder and whether the vessel was fishing in federal or state waters. In 1998, 3 entanglements of humpback whales in state-water fisheries were documented. Nearshore entanglements of turtles have been documented; however, information is not available on whether the vessels involved were permitted by the state or by NOAA Fisheries.

Nearshore and inshore gillnet fisheries occur in state waters from Connecticut through North Carolina - areas where sea turtles also occur. Captures of sea turtles in these fisheries have been reported (NOAA Fisheries SEFSC 2001). Two 10-14 inch mesh gillnet fisheries, the *black drum* and *sandbar shark gillnet fisheries*, occur in Virginia state waters, along the tip of the eastern shore. These fisheries may take sea turtles given the gear type, but no interactions have been observed. NOAA Fisheries is currently undertaking efforts to observe these fisheries during the spring. Similarly, *small mesh gillnet fisheries* occurring in Virginia state waters are suspected to take sea turtles but no interactions have been observed. During May - June 2001, NOAA Fisheries observed 2 percent of the Atlantic croaker fishery and 12 percent of the dogfish fishery (which represent approximately 82% of Virginia's total small mesh gillnet landings from offshore and inshore waters during this time), and no turtle takes were observed.

NOAA Fisheries is also concerned about the take of sea turtles in the *pound net fishery* in Virginia. Pound nets with large mesh and stringer leaders set in the Chesapeake Bay have been observed to (lethally) take turtles as a result of entanglement in the leader. Virginia sea turtle strandings during the spring are consistently high, and given the best available information, including observer reports, the nature and location of the turtle strandings, the type of fishing gear in the vicinity of the greatest number of strandings, and the known interactions between sea turtles and large mesh and stringer pound net leaders, pound nets were considered to be a likely contributor to high sea turtle strandings in 2001 (and likely every spring).

A *whelk fishery* using pot/trap gear is known to occur offshore Virginia. This fishery operates when sea turtles may be in the area. Sea turtles (loggerheads and Kemp's ridleys in particular) are believed to become entangled in the top bridle line of the whelk pot, given a few documented entanglements of loggerheads in whelk pots, the configuration of the gear, and the turtles' preference for the pot contents. Research is underway to determine the magnitude of these interactions and to develop gear modifications to reduce these potential entanglements. In New England waters, leatherbacks have been found entangled in whelk pot lines, so if leatherback turtles overlap with this gear in the action area, entanglement may occur. The *blue crab fishery* using pot/trap gear also occurs in the action area. The magnitude of interactions with these pots and sea turtles is unknown, but loggerheads and leatherbacks have been found entangled in this gear. For instance, in May and June 2002, three leatherbacks were documented entangled in crab pot gear in various areas of the Chesapeake Bay. Given the plethora of crab pot gear throughout the action area, it is possible that these interactions are more frequent than what has been documented.

C. Other Potential Sources of Impacts in the Action Area

A number of anthropogenic activities have likely directly or indirectly affect listed species in the action area of this consultation. These sources of potential impacts include previous dredging projects, pollution, water quality, and sonic activities. However, the impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these elusive sources.

Close coordination is occurring through the section 7 process on both dredging and disposal sites and vessel-related impacts. Whole sea turtles and sea turtle parts have been taken in hopper dredging operations in the vicinity of the action area. From 2000 to 2002, loggerhead and unidentified turtles were incidentally taken during maintenance dredging operations in Thimble Shoal Channel. These takes consisted of fresh dead turtles, but several of the incidents involved decomposed turtle flippers and/or carapace parts. As mentioned previously, 2001 and 2002 dredging operations in Cape Henry and York Spit Channels have also incidentally taken sea turtles. As such, hopper dredging in the action area has resulted in the mortality of a number of sea turtles, most of which were loggerheads. Dredging in the surrounding area could have also influenced the distribution of sea turtles and/or disrupted potential foraging habitat.

Within the action area, sea turtles and optimal sea turtle habitat most likely have been impacted by pollution. Marine debris (e.g., discarded fishing line or lines from boats) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990).

Chemical contaminants may also have an effect on sea turtle reproduction and survival. While the effects of contaminants on turtles is relatively unclear, pollution may be linked to the fibropapilloma virus that kills many turtles each year (NOAA Fisheries 1997). If pollution is not the causal agent, it may make sea turtles more susceptible to disease by weakening their immune systems. Furthermore, the Bay watershed is highly developed and may contribute to impaired water quality via stormwater runoff or point sources. However due to the volume of water in the mainstem Chesapeake Bay, the impacts of pollutants may be slightly reduced in the channels to be dredged. In a characterization of the chemical contaminant effects on living resources in the Chesapeake Bay's tidal rivers, the mainstem Bay was not characterized due to the historically low levels of chemical contamination (Chesapeake Bay Program Office 1999).

Excessive turbidity due to coastal development and/or construction sites could influence sea turtle foraging ability. Turtles are not very easily affected by changes in water quality or increased suspended sediments, but if these alterations make habitat less suitable for turtles and hinder their capability to forage, eventually they would tend to leave or avoid these less desirable areas (Ruben and Morreale 1999).

NOAA Fisheries and the U.S. Navy have been working cooperatively to establish a policy for monitoring and managing acoustic impacts from anthropogenic sound sources in the marine environment. Acoustic impacts can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns. It is expected that the policy on

managing anthropogenic sound in the oceans will provide guidance for programs such as the use of acoustic deterrent devices in reducing marine mammal-fishery interactions and review of federal activities and permits for research involving acoustic activities.

D. Conservation and Recovery Actions Reducing Treats to Listed Species

Education and Outreach Activities

A number of activities are in progress that ameliorate some of the adverse effects on listed species posed by activities summarized in the Environmental Baseline. Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species. NOAA Fisheries has been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques. For example, NOAA Fisheries has conducted workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NOAA Fisheries intends to continue and supplement outreach efforts in an attempt to increase the survival of protected species through education on proper release techniques. Education and outreach activities are also methods to reduce the risk of collision represented by the operation of private and commercial vessels. The USCG educates mariners on whale protection measures and uses its programs -- such as radio broadcasts and notice to mariner publications -- to alert the public to potential whale concentration areas. The USCG also participates in international activities (discussed below) to decrease the potential for commercial ships to strike a whale. Recently, an educational video on the ship strike problem was produced and is being distributed to mariners. In addition, outreach efforts under the ALWTRP for fishermen are also increasing awareness among fishermen that is expected in the long run to help reduce the adverse effects of vessel operations on threatened and endangered species in the action area.

Whales

In addition to the ESA measures for federal activities mentioned in the previous section, numerous recovery activities are being implemented to decrease the adverse effects of private and commercial vessel operations on the species in the action area and during the time period of this consultation. These include the Sighting Advisory System (SAS), other activities recommended by the Northeast Recovery Plan Implementation Team for the Right and Humpback Whale Recovery Plans (NEIT) and Southeast Recovery Plan Implementation Team for the Right Whale Recovery Plan (SEIT), and NOAA Fisheries regulations.

In 1994, NOAA Fisheries established the NEIT for the northern right whale and humpback whale recovery plans. Membership of the NEIT consists of representatives from federal and state regulatory agencies and is advised by a panel of scientists with expertise in right and humpback whale biology. The Recovery Plans describe steps to reduce impacts to levels that will allow the two species to recover and rank the various recovery actions in order of importance. The NEIT provides advice to the various federal and state agencies or private entities on achieving these national goals within the Northeast Region. The NEIT agreed to focus on habitat and vessel related issues and rely on the take reduction planning process under the MMPA for reducing takes in commercial fisheries. Through the deliberations of the NEIT, NOAA Fisheries has implemented a number of activities that reduce the potential for adverse effects to endangered whales from the aforementioned state, federal, and private activities. For

example, the NEIT was the driving force behind the outreach activities described above which promote awareness of the right whale ship strike problem among commercial ship operators.

The Northeast Sighting Advisory System (SAS), originally called the "Early Warning System", was designed to document the presence of right whales in and around critical habitat and nearby shipping/traffic separation lanes in order to avert ship strikes. Through a fax-on-demand system, fishermen and other vessel operators can obtain SAS sighting reports and, in some cases, make necessary adjustments in operations to decrease the potential for interactions with right whales. The SAS activity has also served as the only form of active entanglement monitoring in the critical habitat areas, and several entanglements in both the Cape Cod Bay and Great South Channel areas have been reported by SAS flights. Some of these sighting efforts have resulted in successful disentanglement of right whales. SAS flights have also contributed to sightings of dead floating animals that can occasionally be retrieved to increase our knowledge of the biology of the species and effects of human impacts.

In one recovery action aimed at reducing vessel-related impacts, including disturbance, NOAA Fisheries published a proposed rule in August 1996 restricting vessel approach to right whales (61 FR 41116) to a distance of 500 yards. The Recovery Plan for the Northern Right Whale identified anthropogenic disturbance as one of many factors which had some potential to impede right whale recovery (NOAA Fisheries 1991b). Following public comment, NOAA Fisheries published an interim final rule in February 1997 codifying the regulations. With certain exceptions, the rule prohibits both boats and aircraft from approaching any right whale closer than 500 yds. Exceptions for closer approach are provided for the following situations, when: (a) compliance would create an imminent and serious threat to a person, vessel, or aircraft; (b) a vessel is restricted in its ability to maneuver around the 500-yard perimeter of a whale; ©) a vessel is investigating or involved in the rescue of an entangled or injured right whale; or (d) the vessel is participating in a permitted activity, such as a research project. If a vessel operator finds that he or she has unknowingly approached closer than 500 yds, the rule requires that a course be steered away from the whale at slow, safe speed. In addition, all aircraft, except those involved in whale watching activities, are excepted from these approach regulations. This rule is expected to reduce the potential for vessel collisions and other adverse vessel-related effects in the environmental baseline.

In April 1998, the USCG submitted, on behalf of the United States, a proposal to the International Maritime Organization (IMO) requesting approval of a mandatory ship reporting system (MSR) in two areas off the east coast of the United States. The USCG worked closely with NOAA Fisheries and other agencies on technical aspects of the proposal. The package was submitted to the IMO's Subcommittee on Safety and Navigation for consideration and submission to the Marine Safety Committee at IMO and approved in December 1998. The USCG and NOAA will play important roles in helping to operate the MSR system, which was implemented on July 1, 1999.

Through deliberations of the NEIT and its Ship Strike Committee, NOAA Fisheries and the National Ocean Service (NOS) recently revised the whale watch guidelines for the Northeast, including the Studds-Stellwagen National Marine Sanctuary.

Sea Turtles

NOAA Fisheries has implemented a series of regulations aimed at reducing the potential for incidental mortality of sea turtles in commercial fisheries. In particular, NOAA Fisheries has required the use of TEDs in southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the Mid-Atlantic area (south of Cape Henry, Virginia) since 1992. It has been estimated that TEDs exclude 97% of the turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. For instance, on February 21, 2003, NOAA Fisheries issued a final rule to amend the sea turtle protection regulations to enhance their effectiveness in reducing sea turtle mortality resulting from trawling in the Atlantic and Gulf Areas of the southeastern United States (68 FR 8456). These regulations included modifications to the TED design in order to exclude leatherbacks and large, sexually mature loggerhead and green turtles. Note that with the expansion of fisheries to previously underutilized species of fish, trawl effort directed at species other than shrimp or summer flounder -- and that does not meet the definition of a summer flounder trawl as specified in the TED regulations -- may be an undocumented source of mortality for which TEDs should be considered.

NOAA Fisheries has also developed a TED which can be used in a type of trawl known as a flynet, which is sometimes used in the mid-Atlantic and northeast fisheries for summer flounder, scup, and black sea bass. This TED is currently being tested in flynets. If observer data conclusively demonstrate a need for such TEDs, regulations will be formulated to require use of TEDs in this fishery, once such a device has been perfected.

On December 3, 2002, NOAA Fisheries published restrictions on the use of gillnets with larger than 8 inch stretched mesh, in federal waters (3-200 nautical miles) off of North Carolina and Virginia (67 FR 71895). These restrictions were implemented to reduce the impact of the monkfish and other large-mesh gillnet fisheries on endangered and threatened sea turtles in areas where sea turtles are known to concentrate. As a result, gillnets with larger than 8 inch stretched mesh are prohibited in federal waters north of the North Carolina/South Carolina border at the coast to Oregon Inlet at all times; north of Oregon Inlet to Currituck Beach Light, NC from March 16 through January 14; north of Currituck Beach Light, NC to Wachapreague Inlet, VA from April 1 through January 14; and, north of Wachapreague Inlet, VA to Chincoteague, VA from April 16 through January 14. Federal waters north of Chincoteague, VA are not affected by these new restrictions, although NOAA Fisheries is looking at additional information to determine whether expansion of the restrictions are necessary to protect sea turtles as they move into northern Mid-Atlantic and New England waters. These measures are in addition to Harbor Porpoise Take Reduction Plan measures that prohibit the use of large-mesh gillnets in southern Mid-Atlantic waters (territorial and federal waters from Delaware through North Carolina out to 72° 30'W longitude) from February 15-March 15, annually.

Existing information indicates that pound nets with large mesh and stringer leaders as used in the Virginia Chesapeake Bay incidentally take sea turtles. Based on the available information, NOAA Fisheries determined that fishing with this gear is likely a major contributor to spring sea turtle strandings in the Virginia Chesapeake Bay. To address the high and increasing level of sea turtle strandings, on June 17, 2002, NOAA Fisheries published an interim final rule that restricted the use of all pound net leaders of 8 inches or greater stretched mesh and all pound net

leaders with stringers in Virginia waters of the mainstem Chesapeake Bay and tributaries from May 8 to June 30 each year (67 FR 41196).

The NOAA Fisheries has also developed specific sea turtle handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities to prevent injury. The Sea Turtle Handling and Resuscitation Techniques are regulations which were published (revised) in the Federal Register on December 31, 2001. As stated in 50 CFR 223.206(d)(1), any sea turtle taken incidentally during fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to a series of procedures.

While this does not refer to a specific regulation, there is an extensive array of Sea Turtle Stranding and Salvage Network (STSSN) participants along the Atlantic and Gulf of Mexico coasts who not only collect data on dead sea turtles, but also rescue and rehabilitate live stranded turtles. Data collected by the STSSN are used to monitor stranding levels and compare them with fishing activity in order to determine whether additional restrictions on fishing operations are needed. These data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. All of the states that participate in the STSSN are collecting tissue for and/or conducting genetic studies to better understand the population dynamics of sea turtle species. These states also tag live turtles when encountered (either via the stranding network through incidental takes or in-water studies). Tagging studies help provide an understanding of sea turtle movements, longevity, and reproductive patterns, all of which contribute to our ability to reach recovery goals for the species.

Unlike cetaceans, there is no organized, formal program for at-sea disentanglement of sea turtles. However, disentanglement guidelines are being considered by NOAA Fisheries pursuant to conservation recommendations issued with several recent section 7 consultations. Entangled sea turtles found at sea in recent years have been disentangled by STSSN members, the whale disentanglement team, the USCG, and fishermen. Staff of the Maine Department of Marine Resources (DMR) has received anecdotal reports from fishermen who have disentangled leatherbacks from their lobster pot gear (J. Lewis, pers. comm.).

Summary and Synthesis of the Status of the Species and Environmental Baseline

In summary, the potential for activities that may have previously impacted listed species (dredging, vessel operations, military activities, commercial and state fisheries, etc.), to affect whales, sea turtles, and shortnose sturgeon remains throughout the action area of this consultation on the ACOE's dredging of the Cape Henry, York Spit, York River Entrance and Rappahannock Shoal Channels. However, recovery actions have been undertaken as described and continue to evolve. Although those actions have not been in place long enough for a detectable change in most listed species populations to have occurred, those actions are expected to benefit listed species in the foreseeable future. These actions should not only improve conditions for listed whales, sea turtles, and shortnose sturgeon, they are expected to reduce sources of human-induced mortality as well.

However, a number of factors in the existing baseline for the large whales considered in this Opinion (especially right whales), and sea turtles (especially loggerheads and leatherbacks) leave cause for considerable concern regarding the status of these populations, the current impacts upon these populations, and the impacts associated with future activities planned by the state and federal agencies.

- The right whale population continues to be declining. Based on recent estimates, NOAA Fisheries considers the best approximation for the number of North Atlantic right whales to be 300 +/- 10%. Losses of adult whales due to ship strikes and entanglements in fishing gear continue to depress the recovery of this species.

- The population of leatherback sea turtles in the Atlantic Ocean does not appear to be increasing; it is either declining or stable depending on whether we accept conservative or optimistic estimates, respectively.

- The northern subpopulation of loggerhead sea turtles is stable, at best, or declining, and currently numbers only about 3,800 nesting females. The percent of northern loggerheads represented in sea turtle strandings in northern U.S. Atlantic states is over-representative of their total numbers in the overall loggerhead population. Current take levels from other sources, particularly fisheries, are high.

EFFECTS OF THE ACTION

This section of a biological opinion assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

Several listed species are likely to be present in the action area at various times of the year and may therefore be adversely affected either directly or indirectly by the dredging and/or transport phases of this project. The primary concern for sea turtles and shortnose sturgeon is entrainment in the draghead of the hopper dredge, while the main concern for endangered whales involves the potential for vessel collisions during the disposal process.

The channels under consideration in this BO are part of the coastal corridor through which sea turtles migrate. In addition, the Chesapeake Bay is apparently an important foraging area for juvenile sea turtles and interactions could occur during migrations into or out of the Bay or while sea turtles are foraging in the area. Sea turtles are likely to be feeding on or near the bottom of the Chesapeake Bay during the warmer months, with loggerhead and Kemp's ridley sea turtles being the most common species in these waters. Green turtles are not present in detectable numbers in the Chesapeake Bay, but their occurrence has been documented on numerous occasions and as such, this species may be impacted by the proposed project. Leatherback sea turtles may also be present in the action area, but would be more likely to occur near the Dam Neck disposal site and be more subject to vessel collisions than dredge entrainment due to their

size and behavioral characteristics. Hawksbill turtles may occasionally enter the area and may therefore interact with the project operations; however, these instances would be extremely rare.

One of the main factors influencing sea turtle presence in northern waters is seasonal temperature patterns (Ruben and Morreale 1999). Temperature is correlated with the time of year, with the warmer waters in the late spring, summer, and early fall being the most suitable for cold-blooded sea turtles. Dredging in Virginia waters should be completed when sea turtles are not present (generally December through March) in order to alleviate any impacts. However, should all options be exhausted and the ACOE determines that dredging needs to be completed from April to November, the likelihood that dredging activities would affect sea turtles is greater at this time than in other times of the year.

To some extent, water depth also dictates the number of sea turtles occurring in a particular area. Waters in and around the channel areas range from approximately 39 to 59 ft deep. Satellite tracking studies of sea turtles in the Northeast found that turtles mainly occurred in areas where the water depth was between approximately 16 and 49 ft (Ruben and Morreale 1999). This depth was interpreted not to be as much an upper physiological depth limit for turtles, as a natural limiting depth where light and food are most suitable for foraging turtles (Morreale and Standora 1990). In the Chesapeake Bay, Kemp's ridleys were generally found in waters less than 16 ft deep, and loggerheads were located in waters 13 to 66 ft in depth (NOAA Fisheries 1993). The channel depths and the depths preferred by sea turtles overlap only slightly, suggesting that loggerheads and Kemp's ridleys in the Chesapeake Bay will not frequent the deep channels where dredging occurs, or at least not likely use these channels as primary habitat. However, these species may be found outside their typical depth range and closer to the channels proposed for dredging. Radio telemetry data collected from 1981 to 1984 and other sources of information suggest that within the action area, loggerheads frequent the York River Entrance and York Spit Channels, while ridleys remain the shallow grass areas of the Mobjack Bay near York Spit (Byles 1988, NOAA Fisheries 1993). The Cape Henry Channel at the mouth of the Bay is more likely to be a migrational route versus a foraging route for turtles (Byles 1988). Nevertheless, sea turtles have been found in the action area and may be impacted by dredging activities, as takes have previously been documented in these channels.

Shortnose sturgeon are more frequently encountered in the Maryland waters of the Chesapeake Bay in comparison to Virginia. However, shortnose sturgeon have historically been found as far south as the Rappahannock River (Skjeveland et al. 2000). A sturgeon captured from the Rappahannock River in May of 1997 during an Atlantic sturgeon reward program in Virginia tributaries was confirmed as a shortnose sturgeon (Spells 1998). Distribution and movements of shortnose sturgeon in the Bay are poorly understood at this time, in part because this species is often confused with Atlantic sturgeon. Therefore, the NOAA Fisheries must implement a conservative approach and conclude that shortnose sturgeon may be present in the action area and that the species may be vulnerable to project impacts.

Endangered whales, including humpback, fin, and right whales, could migrate through the action area at various times of the year. As these species are found more frequently in deeper offshore waters rather than in shallow nearshore or inshore waters, they would be more likely to occur in the vicinity of the Dam Neck disposal site than in other parts of the action area.

It is difficult to determine the exact amount that will be dredged each year in the future as the amount of material is dependent on funding and the condition of the channel. The approximate magnitude of dredging in these channels should remain approximately the same as in previous years, with a maximum of 5 million cy from all four channels combined ®. Marsh, ACOE, personal communication 2001). This quantity represents the maximum amount of material to be dredged from these channels, but there is the likely possibility that a much smaller amount of material could be removed from these areas in the future and this maximum amount of material will not be removed every year. As such, this opinion assesses the impacts of dredging for a range of material to be dredged from all four channels in any given calendar year. The impacts to listed species will likely be reduced or magnified, depending on the magnitude of the project. This BO considers the potential effects of dredging as much as 5 million cy annually and as little as 1 million cy or less annually.

As mentioned, this consultation was reinitiated due to take of a live green and dead Kemp's ridley sea turtle during relocation trawling conduced in association with 2002 dredging events. The consultation will consider if a new ITS or other measures to monitor or reduce future sea turtle takes are warranted. While dredging when sea turtles are not present in the action area is strongly recommended as impacts of the project on sea turtles will be minimized, this BO considers the effects of dredging on sea turtles and other listed species during the time when they occur in the action area.

Effects of Dredging and Associated Activities

NOAA Fisheries has determined that maintenance dredging of the Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels (and associated activities) may adversely affect threatened and endangered species in four different ways: (1) the proposed action can alter foraging habitat; (2) dredges can entrain and kill sea turtles and shortnose sturgeon; (3) relocation trawling conducted in association with dredging may injure or kill sea turtles and displace the species out of their preferred habitat; and (4) the proposed action can increase the number of species (turtles and whales in particular) injured or killed in collisions with vessels by increasing vessel traffic in the action area.

Alteration of foraging habitat

The sea turtle recovery plans identify the impacts of dredging as both the destruction or degradation of habitat and the incidental take of sea turtles. The proposed project involves both types of impacts. Since dredging involves removing the bottom material down to a specified depth, the benthic environment could be severely impacted by dredging operations. Dredging would likely cause indirect effects on sea turtles by reducing prey species through the alteration of the existing biotic assemblages. Of the listed species found in the action area, loggerhead and Kemp's ridley sea turtles are the most likely to utilize these areas for feeding, foraging mainly on benthic species, namely crabs and mollusks (Morreale and Standora 1992, Bjorndal 1997). Kemp's ridleys have been found at the mouth of the York River and are known to forage at York Spit. For instance, by way of satellite monitoring, a Kemp's ridley (CCL = 58.6 cm) was found foraging along the shoreline near Mobjack Bay from June to mid-July 2002 (Mansfield and Musick 2003).

The loss of foraging habitat could be especially detrimental to sea turtles because these species primarily enter Northeast/mid-Atlantic shallow harbors and bays to forage (NOAA Fisheries 1995). Turtles are not very easily affected by changes in water quality, increased suspended sediments, or even by moderate alterations of flow regimes. Nevertheless, if these changes make the habitat less suitable for turtles, in the long run sea turtles would tend to leave or avoid these less desirable areas, especially if they became food limited (Ruben and Morreale 1999). However, it is important to note that some of the prey species targeted by turtles are mobile and are likely to avoid the dredge. In addition, the proposed dredging is not located in an area identified as critical habitat. While some areas of the Chesapeake Bay may be more desirable to certain turtles due to prey availability, there is no information to indicate that any of the four channels proposed for maintenance dredging have more abundant turtle prey or better foraging habitat than other areas of the Bay. The assumption can be made that sea turtles are not likely to be more attracted to the channel areas than to other foraging areas in the Bay and should be able to find sufficient prey in alternate areas. Additionally, recolonization by benthic organisms is expected to occur within approximately 12 to 24 months, thus while available foraging habitat may be reduced temporarily, long term effects to listed species' benthic prey are expected to be minimal.

The absence of sightings of shortnose sturgeon in Virginia waters of the Chesapeake Bay suggests that this species is unlikely to detect or be affected by any changes in the density of prey in the areas proposed for dredging. While shortnose sturgeon forage on benthic species, there is no evidence to suggest that the species could not find alternative foraging areas in the Chesapeake Bay or that shortnose sturgeon are likely to make frequent use any of the areas targeted for dredging for feeding purposes. Thus, NOAA Fisheries anticipates that the maintenance dredging activities are not likely to disrupt normal feeding behaviors for sea turtles or shortnose sturgeon and are not likely to remove critical amounts of prey resources from the Bay.

Entrainment

Entrainment is the most imminent danger for sea turtles and shortnose sturgeon during selected dredging operations because hopper dredges are known to kill these species (Magnuson et al. 1990, Slay 1995). The National Research Council's Committee on Sea Turtle Conservation (1990) estimated that dredging mortalities, along with boat strikes, were second only to fishery interactions as a source of probable lethal takes of sea turtles. Experience has shown that injuries sustained by sea turtles entrained in the hopper dredge dragheads are usually fatal. Mortality in hopper dredging operations occurs when the species are sucked into the dredge draghead, pumped through the intake pipe and then killed as they cycle through the centrifugal pump and into the hopper. Because entrainment is believed to occur primarily while the draghead is operating on the bottom, it is likely that only those species feeding or resting on or near the bottom would be vulnerable to entrainment. In relatively rare cases, animals may be entrained if suction is created in the draghead by current flow while the device is being placed or removed, or if the dredge is operating on an uneven or rocky substrate and raises off the bottom. However, it is possible to operate the dredge in a manner that minimizes potential for such incidents as noted in the Monitoring Specifications for Hopper Dredges (Appendix C).

Entrained sea turtles have been documented with greater frequency than shortnose sturgeon, likely as a result of the turtle's larger size and the operation of hopper dredges in areas where sea

turtles are more common than shortnose sturgeon. In King's Bay, Georgia, turtle parts were found at the mouth of the hopper dredge draghead (Slay and Richardson 1988), and at least 38 sea turtle mortalities associated with hopper dredging were recorded during 1991 in three ports located in Brunswick, Georgia, Savannah, Georgia, and Charleston, South Carolina (Slay 1995).

Documented turtle mortalities are more common in the southeastern U.S. probably due to the greater abundance of turtles in these waters, but the potential for an individual sea turtle to be entrained in hopper dredges would be the same for turtles present in the Northeast and Mid-Atlantic. Sea turtle mortality in dredging activities has been documented in the Northeast; a loggerhead turtle was taken by a hopper dredge off the coast of Sea Girt, New Jersey during an ACOE beach renourishment project on August 23, 1997. This turtle was closed up in the hinge between the draghead and the dragarm as the dragarm lifted off the bottom. Additionally, during the dredging of 1.2 million cy of sediment from Delaware Bay in 1994, a loggerhead turtle was entrained in a hopper dredge.

Sea turtle takes have also occurred in the vicinity of the channels proposed for dredging. In nearby Thimble Shoals Channel in the mouth of the Chesapeake Bay, maintenance dredging took several turtles during the warmer months of 2000, 2001, and 2002. In 2000, three turtles were taken in five different loads. A total of 15 incidents of turtles and/or turtle parts were taken in association with dredging in Thimble Shoal Channel during 2001, and one turtle was taken in the spring of 2002. The following table depicts the various incidents in Thimble Shoal Channel from 2000 to 2002.

Table 2. Incidental sea turtle takes during maintenance dredging activities in Thimble Shoals Channel, Virginia, from 2000 to 2002.

Date	Species	Comments
7-24-00	Unidentified species	Three unidentifiable pieces of plastron recovered from the discharge screening.
8-22-00	Loggerhead	Fresh loggerhead recovered from the port draghead. Turtle's neck was broken, the muscles were still pink, and the barnacles on the carapace were alive.
8-25-00	Loggerhead	Piece of loggerhead carapace and attached tissue was recovered.
8-25-00	Presumably loggerhead	In a load immediately after the other August 25 take, a section of digestive tract was recovered.
8-27-00	Loggerhead	Decomposed loggerhead with a missing section of carapace and many broken bones recovered. The three takes (two on August 25 and one on August 27) were believed to be the same animal given the size of animal, species, location, state of decomposition, and sections of missing carapace.
8-7-01	Loggerhead	Fresh, whole loggerhead with a cracked carapace discovered in the draghead
8-9-01	Loggerhead	Carapace and right front flipper of a fresh loggerhead found lodged in the port draghead
8-16-01	Unidentified species	Decomposed right front flipper recovered from the inflow screening basket

8-17-01	Loggerhead	Sections of a loggerhead's carapace, plastron, muscle, and digestive tract found in the inflow screening basket. Several small veins and arteries still had a bright red coloration, indicating fresh take.
8-20-01	Loggerhead	Rear left flipper and parts of a fresh loggerhead turtle found.
8-21-01	Loggerhead	Decomposed front flippers of a loggerhead recovered from the port draghead (a portion partially underneath the draghead and a portion pinched in the hinge on outside of draghead).
8-22-01	Loggerhead	Severely decomposed portion of a loggerhead carapace found in the inflow mid screening basket. While difficult to determine conclusively, it is possible that the decomposed parts taken on August 21 and August 22 were from the same turtle.
8-24-01	Loggerhead	Decomposed rear flipper of a loggerhead recovered from the inflow fore screening basket.
8-28-01	Loggerhead	Fresh loggerhead, missing only a portion of its carapace, found lodged in the bottom of the starboard draghead. Fragments of this loggerhead's carapace were also removed from the intake screening basket.
9-26-01	Unidentified species	Decomposed piece of an unknown turtle's plastron found in the overflow screening basket.
10-23-01	Unidentified species	Carapace piece from an unknown species of turtle found in the overflow screening basket.
11-4-01	Kemp's ridley	Piece of Kemp's ridley carapace recovered from the inflow screening basket.
11-11-01	Unidentified species	Portion of a flipper and two ribs without attached tissue from an unknown species of turtle recovered.
11-11-01	Unidentified species	Portion of the plastron (with no tissue) from an unknown species of turtle recovered.
11-20-01	Loggerhead	Two carapace fragments and associated tissue from a fresh loggerhead were taken.
4-24-02	Loggerhead	Fresh carapace fragment found with skin attached in inflow starboard forward basket. Turtle taken while observer was off shift at night.

While these takes occurred in an area near the four channels proposed for maintenance dredging, incidental takes have occurred in the Cape Henry and York Spit Channels as well. In 2001 and 2002, 25 takes were documented, with 21 of these takes consisting of fresh dead animals. Greater than 3 million cy of material (and less than 5 million cy) were dredged from these channels in 2001 and 2002 combined[2]. Table 3 provides details on each of these incidents. There were no documented incidents of turtles taken in dredging activities in the Cape Henry or York Spit Channels prior to 2001, although most of the previous dredging activity was

[2]Note that in 2002, the ACOE dredged 2,650,000 cy of material from Cape Henry and York Spit Channels. The anticipated amount to be dredged was over 3 million cy, but the contractor left 968,000 cy at the end of the year. NOAA Fisheries based the anticipated incidental take for 2002 on the ACOE's previous determination that the 2002 dredging amount would be greater than 3 million cy. In October 2001, 350,000 cy of material had been removed from Cape Henry Channel and dredging continued into November.

conducted in the winter. No turtles have been taken in dredging operations in the York River Entrance or Rappahannock Shoal Channels.

It should be noted that the observed takes may not be representative of all the turtles killed during dredge operations. Typically, endangered species observers are required to observe a total of 50% of the dredge activity (i.e., 6 hours on watch, 6 hours off watch). As such, there is the possibility that a turtle could be taken by the dredge and go unnoticed, if the observer was off watch and the dredge company either did not report or was unable to identify the turtle incident. NOAA Fisheries raised this issue to the ACOE during the 2002 season, after several turtles were taken in the Cape Henry and York Spit Channels, and expressed the need for 100% observer coverage. On September 30, 2002, the ACOE informed the dredge contractor that when the observer was not present, the cage should not be opened unless it is clogged. This modification was to ensure that any sea turtles that were taken and on the intake screen (or in the cage area) would remain there until the observer evaluated the load. The ACOE's letter further stated "Crew members will only go into the cage and remove wood, rocks, and man-made debris; any aquatic biological material is left in the cage for the observer to document and clear out when they return on duty. In addition, the observer is the only one allowed to clean off the overflow screen. This practice provides us with 100% observation coverage and shall continue." Theoretically, all sea turtle parts were observed under this scheme, but the frequency of clogging in the cage is unknown at this time. Obviously, the most effective way to ensure that 100% observer coverage is attained is to have a NOAA Fisheries-approved endangered species observer monitoring all loads at all times. This level of observer coverage would document all turtle interactions and better quantify the impact of dredging on turtle populations.

While turtles primarily forage in shallow environments, they have been found resting in deeper waters, which could cause additional impacts from dredging activities. In 1981, observers documented the take of 71 loggerheads by a hopper dredge at the Port Canaveral Ship Channel, Florida (Slay and Richardson 1988). This channel is a deep, low productivity environment in the Southeast Atlantic that encourages turtles to rest on the bottom, making them extremely vulnerable to entrainment. The large number of turtle mortalities at the Port Canaveral Ship Channel in the early 1980s resulted in part from turtles being buried in the soft bottom mud, a behavior known as brumation, but this is not a common occurrence everywhere sea turtles inhabit. However, chelonid turtles have been found to make use of deeper, less productive channels as resting areas that afford protection from predators because of the low energy, deep water conditions. Leatherbacks have been shown to dive to great depths, often spending a considerable amount of time on the bottom (NOAA Fisheries 1995). The crushing of sea turtles is not as likely to happen in the action area because turtles are not known to burrow into the sediment and become dormant as they apparently do further south.

However, it should be noted that several sea turtles stranded on Virginia shores with crushing type injuries from May 25 to October 15, 2002. The Virginia Marine Science Museum (VMSM) found 10 loggerheads, 2 Kemp's ridleys, and 1 leatherback exhibiting injuries and structural damage consistent with what they have seen in animals that were known dredge takes. While it cannot be conclusively determined that these strandings were the result of dredge interactions, the link is possible given the location of the strandings (e.g., in the southern Bay near the dredging activity), the time of the documented strandings in relation to dredge operations, the lack of other ongoing activities which may have caused such damage, and the nature of the

injuries (e.g., crushed or shattered carapaces and/or flipper bones, black mud in mouth). A dredge could crush an animal as it was setting the draghead on the bottom, or if the draghead was lifting on and off the bottom due to uneven terrain, but the actual cause of these crushing injuries cannot be determined at this time. Further analyses need to be conducted to better understand the link between crushed strandings and dredging activities, and if those strandings need to be factored into an incidental take level. More research also needs to be conducted to determine if sea turtles are in fact undergoing brumation in Virginia waters. Regardless, it is possible that dredges are taking animals that are not observed on the dredge (in the inflow or outflow screens), which may result in strandings on nearby Virginia beaches.

In the event that shortnose sturgeon are in the action area, individuals of this species could also be entrained in the dredge or incur crushing injuries. Shortnose sturgeon typically prefer deeper waters and are benthic foragers, which would magnify the potential for dredging interactions occurring on the bottom in the deep channels. To date, no shortnose sturgeon have been documented as incidental takes in Virginia hopper dredging activities (or any hopper dredging activities in other areas), but Atlantic sturgeon have been documented as taken by hopper dredges (Pers. comm. E. Hawk to K. Damon-Randall, April 2002). Although there is currently no evidence of shortnose sturgeon presence in the channels for which maintenance dredging is proposed, the occurrence in other areas of the Bay and rivers to the south suggests that this species may be present on rare occasions. No information is currently available on which times of the year this species could be present. Due to the apparent rarity of the species in the Virginia waters of the Chesapeake Bay, NOAA Fisheries anticipates the level of interaction, if any, to be extremely low or discountable.

Humpback, fin, and right whales are highly unlikely to be entrained by the dredge due to their size and offshore distribution.

Impacts of relocation trawling

Measures have been undertaken by the ACOE to reduce the takes of sea turtles in Virginia dredging activities. For instance, these measures have included reevaluating all dredging procedures to assure that the operation of the dragheads and turtle deflectors were in accordance with the project specifications; modifying dredging operations per the recommendation of Mr. Glynn Banks of the ACOE Engineering Research and Development Center; training the dredge crew and all inspectors in proper operation of the dragpipe and turtle deflector systems; and initiating sea turtle relocation trawling. Proper use of draghead deflectors prevent an unquantifiable yet substantial number of sea turtles from being entrained and killed in dredging operations. Tests conducted by the ACOE's Jacksonville District using fake turtles and draghead deflectors showed convincingly that the sea turtle deflecting draghead is useful in reducing entrainments. Note, however, that despite measures implemented to reduce additional sea turtle takes, turtles continued to be taken by the hopper dredge in Cape Henry Channel during 2001 and 2002. While measures may be implemented to reduce turtle takes, some turtle mortalities may still ensue; thus, curtailing dredging activities is the best way to ensure sea turtles are not impacted.

One measure that has been found to be relatively successful in minimizing turtle takes is relocation trawling. Relocation trawling has been successful at temporarily displacing Kemp's ridley, loggerhead, and green sea turtles from channels and nearshore mining areas in both the

Atlantic and Gulf of Mexico (e.g., Thimble Shoals, Cape Henry, and York Spit Channels, Virginia; Morehead City, Wilmington, and Bogue Banks, North Carolina; Charleston, South Carolina; Kings Bay, Georgia; Canaveral Entrance Channel, Tampa Bay, Charlotte Harbor, and St. Petersburg Harbor, Florida; MR-GO, Louisiana; Freeport Harbor and Sabine-Neches Waterway, Texas) during periods when hopper dredging was imminent or ongoing. While relocation trawling is implemented to alleviate potential sea turtle entrainment and death, this trawling may affect turtles by moving them out of their preferred habitat or injuring them during the trawling process.

Relocation trawling moves animals out of their preferred environment, which may result in additional stress on the animal. While the effects of this relocation are not fully known or quantifiable, if the sea turtle is not injured or its swimming ability impaired, it would seem likely that the turtle could find other suitable foraging habitat or move to its desired location. Some turtles captured during relocation trawling operations return to the dredge site and are subsequently recaptured. Typically sea turtles are relocated at least 3 miles from the capture location. The likelihood of recapture may be related to where the animal was relocated, relocation distance, duration of dredging projects, and an individual turtle's preferences or site fidelity. In Canaveral Channel in the early 1980s toward the end of a 90-day dredging project, about 25-33% of the turtles caught in a given day were recaptures of turtles previously relocated in the project. Relocation sites were 5 miles north, 5 miles south, and 5 miles east of the channel. One of those turtles was caught and relocated on 7 different occasions. One was caught and removed one night and taken again on the following night. Some turtles appear to return to the area regardless of where they are moved, while others are never seen again (E-mails, C. Oravetz to E. Hawk, T. Henwood to E. Hawk, September 27, 2002). In any event, relocating animals out of the channels may subject them to stress and require the turtles to undergo extra effort to migrate back to their intended habitat.

Relocation trawling may also result in sea turtle injury or mortality. While most voluntary dives appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status, the story is quite different in forcibly submerged turtles where oxygen stores are rapidly consumed, anaerobic glycolysis is activated, and acid-base balance is disturbed, sometimes to lethal levels (Lutcavage and Lutz 1997). Forced submergence of Kemp's ridley sea turtles in shrimp trawls resulted in an acid-base imbalance after just a few minutes (times that were within the normal dive times for the species) (Stabenau et al. 1991). Conversely, recovery times for acid-base levels to return to normal may be prolonged. Henwood and Stuntz (1987) found that it took as long as 20 hours for the acid-base levels of loggerhead sea turtles to return to normal after capture in shrimp trawls less than 30 minutes. This effect is expected to be worse for sea turtles that are recaptured before metabolic levels have returned to normal. The NRC (1990) has suggested that physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles, would be expected to exacerbate the harmful effects of forced submergence from trawl capture.

However, negative impacts to sea turtles from relocation trawling are likely minimized by tow time limits, proper operating procedures, and trained handling personnel. In previous BOs, NOAA Fisheries has limited relocation trawling tow times to 30 minutes. The NRC report "Decline of the Sea Turtles: Causes and Prevention" (NRC 1990) suggested that limiting tow durations to 40 minutes in summer and 60 minutes in winter would yield sea turtle survival rates

that approximate those required for the approval of new TED designs, i.e., 97%. The NRC report also concluded that mortality of turtles caught in shrimp trawls increases markedly for tow times greater than 60 minutes.

While NOAA Fisheries has no evidence yet that any tagged, relocated turtles have subsequently stranded, even properly conducted relocation trawling can result in sea turtle deaths. Henwood (pers. comm. to E. Hawk, December 6, 2002) noted that trawl-captured loggerhead sea turtles died on several occasions during handling on deck during winter trawling in Canaveral Channel in the early 1980s, after short (approximately 30-minute) tow times. However, Henwood also noted that during winter months a significant number of the loggerheads captured at Canaveral during winter months appeared to be physically stressed and in "bad shape" compared to loggerheads captured in the summer months from the same site, which appeared much healthier and robust. Stressed or unhealthy turtles or turtles exposed to repeated forced submergences are more likely to be injured or killed during relocation trawling than healthy turtles.

While unlikely and rare, healthy animals may also be injured during relocation trawling. On November 3, 2002, during relocation trawling conducted in York Spit Channel (with 15-30 minute tows), a Kemp's ridley sea turtle was recovered (REMSA 2002). The fresh dead turtle was bleeding with wounds to the head. VMSM conducted a necropsy and concluded that the animal appeared to be a healthy, fresh dead juvenile Kemp's ridley with the only noted abnormalities to the head. This suggests that the cause of death could have been trawl related.

Accidents on deck during the trawl net emptying procedure may result in turtle injury or death. On one occasion, during a 1998 study conducted by the Gulf and South Atlantic Fisheries Development Foundation, Inc., a Kemp's ridley sea turtle and a manatee were captured in the same trawl net. When emptying the trawl bag on deck, the manatee was accidentally rolled onto the turtle, crushing and killing it (D. Bernhart, pers. comm. to E. Hawk, December 6, 2002).

Prior to 1997, most relocation trawling in association with hopper dredging was performed by personnel from the ACOE's Waterways Experiment Station, under a NOAA Fisheries section 10 incidental take/research permit. Since then, however, relocation trawling has primarily been conducted by private companies. Since around 1998, the companies involved in relocation trawling have relocated more than 200 turtles (most of which were loggerheads), and there have been very few incidents of evident injury or mortality (i.e., the occurrences described previously). For instance, in October 2002, 70 turtles were relocated without injury in a 7-day period at Canaveral Channel, Florida. While most of the turtles caught in relocation trawls have been hard shelled turtles, a live leatherback was caught during a relocation trawling project in Aransas Pass, Texas in May 2003.

The Gulf and South Atlantic Fisheries Development Foundation's (Foundation) August 31, 1998, "Alternatives to TEDs: Final Report," presents data on 641 South Atlantic shallow tows (only one tow was in water over 15 fathoms) all conducted under restricted tow times (55 minutes during April through October and 75 minutes from November through March), and 584 Gulf of Mexico nearshore tows conducted under the same tow time restrictions. Offshore effort in the Gulf of Mexico consisted of 581 non-time restricted tows which averaged 7.8 hours per tow. All totaled, 323 turtle observations were documented: 293 in the nearshore South Atlantic efforts, and 30 in the Gulf efforts (24 nearshore and 6 offshore). Of the 293 South Atlantic

turtles (219 loggerhead, 68 Kemp's ridley, 5 green, and 1 leatherback), only 274 were used in the analyses (201 loggerhead, 67 Kemp's ridley, 5 green, and 1 leatherback) because 12 escaped from the nets after being seen and 7 were caught in try nets. Of the 30 Gulf turtles captured, only 26 were used for the analysis (8 loggerhead, 16 Kemp's ridley, 2 green), as the other 4 either crawled out of the nets or were try net captures. Of the 274 South Atlantic turtles captured using restricted tow times, only 5 loggerheads and 1 Kemp's ridley died because of the interaction. For the Gulf efforts, 26 turtles were captured, resulting in 3 mortalities (1 loggerhead inshore, 1 loggerhead and 1 green offshore). Excluding the turtles caught in the 6 offshore Gulf tows and both offshore mortalities (because of the prolonged, non-restricted tow times), 1,225 time-restricted tows (584 + 641) remain, resulting in 298 trawl-captured turtles (274 + 24) including 7 mortalities, i.e., 2.3% of the interactions resulted in death. Logically, trawl-associated mortalities should be further reduced if tow times are further reduced. Relocation trawling guidelines in previous BOs have limited trawl net tow times to not more than 30 minutes, significantly less than the 55-75 minute restriction, which resulted in the 2.3% turtle mortality in the Foundation's study.

Most relocation trawling has been conducted in Southeast waters, but relocation trawling has occurred in Cape Henry and York Spit Channels, as well as in nearby Thimble Shoals Channel. Trawling in the Cape Henry Channel was conducted from October 13 to November 12, 2001, for 12 hours per day and with 15-30 minute tow times. Four turtles (three loggerheads and one Kemp's ridley) were caught in water temperatures ranging from approximately 15.5 to 19 C. The turtles were relocated approximately four miles off the Virginia coast. In 2002, several incidents of relocation trawling were initiated in Cape Henry and York Spit Channels as a result of triggering a term and condition from the January 2002 BO. From May 26 to June 6, trawling was conducted in Cape Henry, and two loggerheads were captured (in 174 30-minute tows). From September 20-25, trawling was performed in York Spit and no turtles were captured (in 103 30-minute tows). No turtles were taken by the dredge during this time. From October 10 to November 3, trawling was conducted in York Spit and Cape Henry Channels (in whichever channel the dredge was operating) with 15-30 minute tow times for 12 hours a day. Fifteen turtles were relocated (11 loggerheads, 3 Kemp's ridleys, and 1 green), and as described previously, an additional Kemp's ridley turtle was found dead in the trawl. During the October to November trawling period, 5 turtles were captured by the dredge, but 2 of these incidents involved decomposed turtle parts (i.e., cause of death determined not to be related to the current dredging operations). Relocation trawling also occurred in Thimble Shoal Channel from September 6 to October 17, 2001. A total of twelve turtles were caught and released during this time period.

NOAA Fisheries recognizes that a small percentage of turtles captured by relocation trawlers may die during trawling, on deck, or after release, particularly if the animals involved have been previously stressed or are diseased or unhealthy. However, NOAA Fisheries believes that properly conducted and supervised relocation trawling is for the most part safe, beneficial, and unlikely to result in adverse effects to sea turtles. NOAA Fisheries estimates that, overall, sea turtle trawling and relocation efforts will result in approximately 1% mortality of captured

turtles[3]. On the other hand, hopper dredge entrainments invariably result in injury, and are almost always fatal. During previous relocation trawling efforts, few turtles have been taken by the dredge when trawling is occurring. NOAA Fisheries encourages assessment and relocation trawling as a means of reducing sea turtle entrainment in hopper dredges, according to guidelines given in the ITS terms and conditions of this BO.

Collisions with dredges

There have not been any reports of dredge vessels colliding with listed species but contact injuries resulting from dredge movements could occur at or near the water surface and could therefore involve any of the listed species present in the area. Because the dredge is unlikely to be moving at speeds greater than seven knots during dredging operations, blunt trauma injuries resulting from contact with the hull are unlikely during dredging. It is more likely that contact injuries during actual dredging would involve the propeller of the vessel. Contact injuries with the dredge are more likely to occur when the dredge is moving from the dredging area to the dredge disposal site, in particular the Dam Neck site (Appendix B). While the distance between the dredge locations and the disposal site is relatively short, the dredge in transit would be moving at faster speeds than during dredging operations, particularly when empty while returning to the channel. Dredges which have been used in the past can operate at speeds of at least 12.1 knots when loaded and 13.4 knots when empty.

The dredge vessel may collide with marine mammals and sea turtles when they are at the surface. These species have been documented with injuries consistent with vessel interactions and it is reasonable to believe that the dredge vessels considered in this BO could inflict such injuries on marine mammals and sea turtles, should they collide. As mentioned, sea turtles are found distributed throughout the action area in the warmer months, generally from April through November. For instance, an offshore Virginia aerial survey conducted in May 2002 documented sea turtles in the mouth of the Chesapeake Bay and around the Dam Neck disposal site (Coastwise Consulting 2002). Sea turtles will be in the same areas as the dredge and disposal events and as such, it is reasonable to believe that collisions may occur. When these reptiles surface for air (or if they are swimming underwater close to the surface), they will be susceptible to vessel collisions.

Whales have also been sighted at the mouth of the Chesapeake Bay (NOAA Fisheries unpublished data 2002). North Atlantic right, humpback, and fin whales have all been documented in the area between Cape Henry Channel and the Dam Neck disposal site. In general, right whales can be anticipated to be off Virginia from November to December and February to April, humpback whales can be found off Virginia from September to April, and fin whales may be in the action area (albeit they are generally found in more offshore waters) from October to January.

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[3] This estimate was derived from the Foundation's study (i.e., 2.3% of trawl interactions resulted in mortality with 55-75 minute tow times), the short duration of relocation trawling tow times (less than 30 minutes), and the limited number of lethal takes in comparison to non-injured turtle relocations. This assumes a linear relationship between sea turtle mortality during relocation trawling and tow times.

While vessel strikes represent a notable threat to marine mammals and sea turtles, there is currently no rule or regulation that implements a requirement for vessel speed. However, NOAA Fisheries has prepared a draft Ship Strike Reduction Strategy that outlines a number of measures to reduce the threat of ship strikes to right whales. One such measure calls for establishing speed restrictions to minimize collisions. Information included with this strategy indicates that vessels (greater than or equal to 65 feet in length) traveling at speeds of 14 knots and greater are more likely to collide with whales than vessels transiting at slower speeds. The transiting speed of the dredge vessel considered in this opinion will not exceed 13.4 knots. This falls within the range considered by NOAA Fisheries to reduce the risk of ship strikes of right whales. Therefore, while these listed whale species have been sighted in the area where the dredge will be transiting, it is reasonable to believe that collisions with the dredge vessel, operating at speeds of 12 to 13 knots during transit, are unlikely.

If maintaining these channels would result in an increase in vessel traffic transiting through the Chesapeake Bay, potential collisions with listed species could increase. However, while information on the possible increase in vessel traffic since the last BO is not available at the time of this consultation, the 1993 BA indicates that increased development and concurrent vessel traffic is not expected in this area.

Shortnose sturgeon are unlikely to be on the surface where they would be vulnerable to a ship strike.

Estimating the Number of Turtles Taken in Dredging and Associated Activities

NOAA Fisheries has anticipated the amount of incidental take that may occur during the proposed dredging activities for a range of dredged material quantities. The amount of incidental take will likely be dependent on the magnitude of the project, but as it is difficult to know the exact amount of material that will be dredged in any given year in the future, the anticipated take amount was determined for several different magnitudes of dredge material.

Based on previous dredging activities and takes in the project area, NOAA Fisheries anticipates that up to 18 loggerhead and 4 Kemp's ridley sea turtles could be entrained annually by maintenance dredging activities in all four channels that involves removing material less than or equal to 5 million cy. For maintenance dredging activities that will remove less than or equal to 3 million cy annually in all four channels, NOAA Fisheries anticipates that up to 10 loggerhead and 2 Kemp's ridley sea turtles could be entrained. NOAA Fisheries further anticipates that 4 loggerhead and 1 Kemp's ridley sea turtle could be entrained during maintenance dredging activities that will remove less than or equal to 1 million cy annually in the Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels. While green turtles are less likely to be in the project area than loggerheads or Kemp's ridley turtles, this species has been documented in the channels where dredging will occur. Based upon previous take levels in the action area (maximum of one turtle in one year), NOAA Fisheries anticipates that one green turtle could be entrained annually during any amount of maintenance dredging in all four channels. Unlike for loggerheads and Kemp's ridleys, the level of anticipated take for green sea turtles in the proposed maintenance dredging projects is not a reflection of the dredging effort because based upon previous capture rates in the action area, the take of a green turtle in these dredging operations may only periodically occur regardless of the magnitude of dredging. No

hawksbill or leatherback sea turtles are anticipated to be taken, due to the rarity of their presence in the action area, behavioral and foraging characteristics, and, for leatherbacks, their size and the lack of documented takes in hopper dredges.

This anticipated take level considered the level of previous sea turtle takes in Cape Henry Channel and Thimble Shoal Channel, the previous incidental take levels for other dredging projects in the vicinity of the action area including Thimble Shoals maintenance dredging and the Virginia Beach Project, and the anticipated magnitude of dredging. For instance, 2001 dredging in Cape Henry Channel took 2 fresh loggerheads and one fresh Kemp's ridley (with the removal of 350,000 cy of material), and 3 turtles were taken in 2000 Thimble Shoals dredging (with the removal of less than 1 million cy). Four loggerheads and 1 Kemp's ridley were estimated to be taken in Thimble Shoals Channel dredging with the removal of 1 million cy of material (NOAA Fisheries Biological Opinions, February 7, 2001 and April 25, 2002). This information was used to estimate that dredging up to 1 million cy in the four channels considered in this opinion would result in 4 loggerhead and 1 Kemp's ridley takes. Dredging 1.3 cy of material from Thimble Shoals Channel during 2001 resulted in the take of 5 fresh turtles, and dredging in the Thimble Shoal and Atlantic Ocean Channels as related to the Virginia Beach Hurricane Protection Project was estimated to take 10 loggerheads and 2 Kemp's ridleys with the removal of 2.7 cy of material (NOAA Fisheries Biological Opinion, September 6, 2001). This information went into determining and extrapolating that an estimated 10 loggerheads and 2 Kemp's ridleys will be taken with the removal of up to 3 million cy from the four channels considered in this BO, and 18 loggerheads and 4 Kemp's ridleys are anticipated to be taken with up to 5 million cy of material.

While decomposed turtle parts are considered to be takes, NOAA Fisheries is most concerned with the takes that appeared to be fresh dead sea turtles and therefore directly attributable to the dredging activities. Thus, the aforementioned anticipated level of take refers to those turtles which NOAA Fisheries confirms as freshly dead. While this definition is subject to some interpretation by the observer, a fresh dead animal may exhibit the following characteristics: little to no odor; edible; fresh blood present; fresh (not necrotic, pink/healthy color) tissue, muscle, or skin; no bloating; color consistent with live animal; and live barnacles. A previously (non-fresh) dead animal may exhibit the following characteristics: foul odor; necrotic, dark or decaying tissues; sloughing of scutes; pooling of old blood; atypical coloration; and opaque eyes. NOAA Fisheries does expect that the maintenance dredging may take an additional unquantifiable number of previously dead sea turtle parts. While decomposed animals taken in federal operations are considered to be takes, as the possession of a listed species is considered a take, NOAA Fisheries recognizes that decomposed sea turtles may be taken in dredging operations that may not necessarily be related to the dredging activity itself. Theoretically, if dredging operations are conducted properly, no takes of sea turtles should occur as the turtle draghead defector should push the turtles to the side and the suction pumps should be turned off whenever the dredge draghead is away from the substrate. However, due to certain environmental conditions (e.g., rocky bottom, uneven substrate), the dredge draghead may periodically lift off the bottom and entrain previously dead sea turtle parts (as well as live turtles) that may be on the bottom through the high level of suction.

Relocation trawling conducted in association with dredging activities may also take sea turtles, but these takes are likely to be live, uninjured animals. It is difficult to determine the magnitude,

or the frequency, of these interactions, but potential take levels can be estimated by previous capture rates from Virginia relocation trawling. As it cannot be foreseen as to whether relocation trawling will occur in any given year or month, this anticipated take level was estimated with the assumption that trawling could occur every month whenever sea turtles are present. The maximum number of turtles relocated in previous Virginia trawling activities was 15 live uninjured turtles in approximately one month (October 10 to November 3, 2002). Relocation trawling could occur any time during the "turtle season", or in Virginia, any time from April 1 to November 30. As such, the maximum duration of relocation trawling in Virginia would be 8 months. Considering that 15 turtles may be taken in one month, this results in a maximum of 120 live, uninjured turtles being relocated each year from the Cape Henry, York Spit, York River Entrance, or Rappahannock Shoals Channels, collectively. Loggerheads, Kemp's ridleys, leatherbacks, and/or greens (or a combination thereof) may be taken during these trawling activities. These species may be present in the action area (albeit in the case of leatherbacks that occurrence may be infrequent) and have all been documented taken in relocation trawls. No hawksbill sea turtles are anticipated to be taken.

The relocation trawling take estimation uses the best available information, but makes several assumptions. First, this take level assumes that turtle distribution in the action area is not variable by month. Take levels were determined by a fall trawling event, and it is possible that turtle abundance in the action area will be higher or lower in the spring and summer. Second, this estimation assumes that turtle distribution will be relatively constant over the years. Relocation trawling has been conducted in Virginia only two years, and this limited amount of data was used to generate this estimated take level (e.g., one year of data noting the maximum number of turtles taken). This take estimation was based upon the best available data, but it is possible that turtle distribution may increase or decrease in future years, changing the number of turtles taken in the trawl from what was anticipated. Third, the estimated capture rate of 120 turtles/year was generated under the assumption that relocation trawling would be conducted for 12 hours/day. If the frequency of trawling is increased beyond 12 hours/day, more turtles could be taken (e.g., if trawling is completed 24 hours/day, the capture rates could double to 240 turtles/year). The trawling guidelines refer to 12 hours/day tows. Fourth, this assumes that trawling will need to be completed each week of each month from April to November. It is highly unlikely that this will occur, as the term and condition requiring trawling may not be triggered or dredging may not need to be completed during the entire "turtle season", so this take level represents a maximum amount, or worst case scenario. Finally, this estimation assumes that different trawl companies and trawlers do not have any variation in turtle catch rates. This take level was generated with one company's trawl data, and if a different vessel is more or less successful at catching turtles, the anticipated take amount would be different. However, the standardized trawling protocol is required of all relocation trawling activities, so it is unlikely that the various trawl companies would have significantly different capture rates.

As observed during 2002 York Spit relocation trawling, lethal sea turtle takes may occur from these activities, but are expected to be rare. Lethal or injurious takes that result from relocation trawling (including capturing, handling, weighing, measuring, tagging, holding and releasing) are anticipated to be one sea turtle each year (either a loggerhead, Kemp's ridley, leatherback, or green turtle).

Based on previous observations, and due to their rare occurrence in the action area and foraging

behavior, NOAA Fisheries does not anticipate that leatherback or hawksbill sea turtles will be entrained by the proposed dredging activities in the Cape Henry, York Spit, York River Entrance and Rappahannock Shoal Channels. Due to their rare occurrence in the action area, NOAA Fisheries does not anticipate shortnose sturgeon to be taken regardless of the time of the year the dredging occurs. If in the future, new information suggests otherwise, NOAA Fisheries will re-assess the anticipated amount of leatherback, hawksbill, or shortnose sturgeon take during these maintenance dredging operations.

Loggerhead sea turtles. Like other long-lived sea turtles, loggerheads delay maturity to allow individuals to grow larger and produce more offspring. As discussed in the Environmental Baseline section, more offspring may compensate for the high natural mortality in the early life stages; i.e., mortality rates of eggs and hatchling are generally high and decrease with age and growth. The risks of delayed maturity are that annual survival of the later life stages must be high in order for the population to grow. Studies demonstrate that population growth is highly sensitive to changes in annual survival of the juvenile and adult stages. Crouse (1999) reports, "Not only have large juveniles already survived many mortality factors and have a high reproductive value, but there are more large juveniles than adults in the population. Therefore, relatively small changes in the annual survival rate impact a large segment of the population, magnifying the effect."

The loggerhead sea turtles in the action area are likely to represent differing proportions of the five western Atlantic subpopulations. Although the northern nesting subpopulation produces about 9 percent of the total loggerhead nests, they comprise more of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia: between 25 and 59 percent of the loggerhead sea turtles in this area are from the northern subpopulation (Sears 1994, Norrgard 1995, Sears et al. 1995, Rankin-Baransky 1997, Bass et al. 1998). The northern subpopulation may be experiencing a significant decline (2.5 - 3.2% for various beaches) due to a combination of natural and anthropogenic factors, demographic variation, and a loss of genetic viability. As discussed in the status of the species section, it is possible that a large amount of the loggerheads which may be taken during the ACOE's proposed dredging activities may originate from the northern subpopulation of loggerheads. Conversely, turtles originating from the southern subpopulation could likewise be taken in large numbers.

Based on previous dredging activities which have employed the same protocols proposed for use by the ACOE for dredging during warmer months, the magnitude of the dredging, and previous levels of incidental take in Virginia channels, NOAA Fisheries anticipates up to 18 loggerheads and 4 Kemp's ridleys could be entrained, seriously injured, or killed annually in maintenance dredging in all four channels involving up to 5 million cy of material. For maintenance dredging involving up to 3 million cy of material in a combination of all four channels, NOAA Fisheries anticipates that up to 10 loggerhead and 2 Kemp's ridley sea turtles could be taken. NOAA Fisheries further anticipates that 4 loggerhead and 1 Kemp's ridley sea turtle could be entrained during maintenance dredging activities that will remove up to 1 million cy annually in the channels considered in this opinion. One turtle (either a loggerhead, Kemp's ridley, leatherback, or green turtle) may be killed during relocation trawling activities.

The death of up to 19 loggerheads (maximum of 18 during dredging and 1 during trawling) during the course of maintenance dredging activities in these channels would represent a loss of

less than 0.5 percent of the estimated number of nesting females in the northern subpopulation. This level of take represents the high end of the spectrum for the proposed project because typical maintenance dredging would not likely involve the maximum amount of material for each channel in the same year, and trawling may not need to be completed in any given year. If 11 loggerheads were killed during the course of maintenance dredging activities in these channels, this would represent a loss of less than 0.29 percent of the estimated number of nesting females in the northern subpopulation, and if 5 loggerheads were killed, 0.13 percent of the estimated number of nesting females in the northern subpopulation would be lost. These are conservative estimates, however, since the loss of loggerhead turtles during these dredging and trawling activities are not likely limited to adult females, the only segment of the population, or subpopulation, for which NOAA Fisheries has any population estimates. Although unlikely to occur, a worst case scenario could occur if all of the loggerheads killed were juvenile females from the northern subpopulation. However, it is more likely that some turtles taken by dredging and trawling activities will be from the northern subpopulation and some from the south Florida subpopulation. For example, based on the origin of turtles as reported by Bass et al. (1998), approximately 46% of the loggerheads found in Virginia waters originate from the northern subpopulation and 46% originate from the south Florida subpopulation.

It could be argued that any amount of lethal take will reduce the numbers of a population. As such, the lethal removal of up to 19 loggerheads would be expected to reduce the number of loggerheads from the respective subpopulation as compared to the number of loggerheads that would have been present in the absence of the proposed action. However, given the status of the loggerhead subpopulations and the estimated number of females, even if all of the loggerhead turtles anticipated to be entrained and killed were juvenile or reproductive females from the northern subpopulation, the loss of up to 19 loggerheads during the annual maintenance dredging and associated activities in the Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels is not anticipated to have a detectable effect on the numbers or reproduction of the affected subpopulation, and therefore is not expected to appreciably reduce the likelihood of survival and recovery of the species. Again note that this maximum magnitude of take reflects a worst case scenario. The level of dredging and trawling (and thus incidental take) may be smaller in any given year.

Kemp's ridley sea turtles. The biology of Kemp's ridleys also suggests that losses of juvenile turtles can have a magnified effect on the survival of this species. The death of 5 Kemp's ridley sea turtles (maximum of 4 during dredging and 1 during trawling) during the course of annual maintenance dredging activities in the channels considered in this opinion would represent a loss of less than 0.17 percent of the population. This level of take would represent the high end of the spectrum for the proposed project because typical maintenance dredging may not involve the maximum amount of material for each channel in the same year and trawling may not need to be completed in any given year. If 3 Kemp's ridleys were killed during the course of maintenance dredging in these channels, this would represent a loss of less than 0.1 percent of the population, and if 2 Kemp's ridleys were killed, 0.07 percent of the estimated number of nesting females in the population would be lost. Similar to information available for loggerheads, these are conservative estimates since the loss of Kemp's ridley sea turtles during these dredging activities are not likely limited to adult females, the only segment of the population for which NOAA Fisheries has any population estimates. Although unlikely to occur, a worst case scenario could occur if all Kemp's ridleys killed were juvenile females.

It could be argued that any amount of lethal take will reduce the numbers of a population. As such, the lethal removal of up to 5 Kemp's ridleys would be expected to reduce the number of Kemp's ridleys as compared to the number of Kemp's ridleys that would have been present in the absence of the proposed action. However, given the estimated number of females in the population, even if all Kemp's ridley sea turtles anticipated to be entrained and killed were reproductive females, this loss is not anticipated to have a detectable effect on the numbers or reproduction of the affected population and therefore is not expected to appreciably reduce the likelihood of survival and recovery of the species.

Green sea turtles. Population estimates for the western Atlantic green sea turtles are not available. However, nesting beach data collected on index beaches since 1989 have shown a general positive trend. While green turtles are not as common in the action area as loggerheads and Kemp's ridleys, one fresh dead green turtle was taken by a hopper dredge in Cape Henry Channel and one live green was relocated from Cape Henry Channel in 2002. Due to these occurrences, NOAA Fisheries anticipates that one green turtle could be entrained annually during any amount of maintenance dredging in all four channels and one lethal take of a green turtle could occur during trawling activities. At this time, the effects of two lethal incidental takes a year on the green turtle population is not known, but this level of take is not likely to represent a significant loss to the population. Given the low numbers of anticipated take and the estimated population size, this loss is not expected to appreciably reduce the likelihood of survival and recovery of the species.

In summary, this biological opinion considered the effects of maintenance dredging in the Cape Henry, York Spit, York River Entrance and Rappahannock Shoal Channels and associated activities in order to accurately assess the impacts to listed species. The primary concern for sea turtles and shortnose sturgeon is entrainment in the draghead of the hopper dredge, while the main concern for endangered whales involves the potential for vessel collisions.

Sea turtle takes have occurred in the action area with the same type of hopper dredge and operational protocol as will be employed in these maintenance dredging projects. In 2001 and 2002, 16 loggerheads, 3 Kemp's ridleys, and 1 green turtle were taken by maintenance dredging in Cape Henry and York Spit Channels (all fresh takes). Additionally, in nearby Thimble Shoals Channel, turtles were taken in hopper dredges from 2000 to 2002. There have been no instances of incidental takes occurring in previous dredging operations in York River Entrance or Rappahannock Shoal Channels.

As future maintenance dredging in the four channels could involve removing a range of dredge material, NOAA Fisheries assessed the project's impacts on listed species and the anticipated level of incidental take for three different magnitudes of dredge material. Based on previous dredging activities, NOAA Fisheries anticipates that 18 loggerheads and 4 Kemp's ridleys could be taken annually in maintenance dredging in all four channels involving up or equal to 5 million cy of material. For maintenance dredging involving up or equal to 3 million cy of material in a combination of all four channels, NOAA Fisheries anticipates that 10 loggerhead and 2 Kemp's ridley sea turtles could be taken. NOAA Fisheries further anticipates that 4 loggerhead and 1 Kemp's ridley sea turtle could be entrained during maintenance dredging activities that will remove up or equal to 1 million cy annually in the channels considered in this opinion. NOAA Fisheries anticipates that one green turtle could be entrained annually during any amount of

maintenance dredging in all four channels. Due to the nature of the injuries expected by entrainment, most of the turtles are expected to die. These estimations of incidental take are based upon the number of turtles previously taken during dredging in the Cape Henry and Thimble Shoals Channels, the incidental take for sea turtles designated in previous BOs, and the amount of material to be dredged for the four channels considered in this opinion.

Sea turtles may also be taken during relocation trawling, conducted in association with dredging operations (per the terms and conditions of this BO). A maximum of 120 live, uninjured turtles (of either loggerhead, Kemp's ridley, leatherback, or green turtles) are anticipated to be taken in relocation trawling each year. Trawling activities may also take one dead sea turtle each year.

Seasonal differences in the potential for interactions with shortnose sturgeon cannot be predicted with the available data. However, due to the low occurrence of this species in the action area and its behavior, NOAA Fisheries does not anticipate shortnose sturgeon to be entrained by the dredging activities, physically struck by the dredge vessel, or affected by any local reductions in prey.

Right, humpback, and fin whales may be affected by the vessels transiting the action area during the disposal phase of these operations, given the potential for collisions with these large whales. While collisions are considered unlikely, a reduction in the speed at which the vessels will be traveling and the practice of maintaining a bridge watch would help reduce the possibility of these interactions.

CUMULATIVE EFFECTS

Cumulative effects, as defined in the ESA, are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Natural mortality of endangered species, including disease (parasites) and predation, occurs in Mid-Atlantic waters. In addition to dredging activities, sources of anthropogenic mortality, injury, and/or harassment of listed species in the action area include incidental takes in state-regulated fishing activities, private vessel interactions, marine debris and/or contaminants.

Future commercial fishing activities in state waters may take several protected species. However, it is not clear to what extent these future activities would affect listed species differently than the current state fishery activities described in the Environmental Baseline section. The Atlantic Coastal Cooperative Statistics Program (ACCSP) and the NOAA Fisheries sea turtle/fishery strategy, when implemented, are expected to provide information on takes of protected species in state fisheries and systematically collected fishing effort data which will be useful in monitoring impacts of the fisheries. NOAA Fisheries expects these state water fisheries to continue in the future, and as such, the potential for interactions with listed species will also continue.

As noted in the Environmental Baseline section, private vessel activities in the action area may

adversely affect listed species in a number of ways, including entanglement, boat strike, or harassment. It is not possible to predict whether additional impacts from these private activities will occur in the future, but it appears likely that they will continue, especially if actions are not taken to minimize these impacts.

Excessive turbidity due to coastal development and/or construction sites could also influence sea turtle foraging ability. As mentioned previously, turtles are not very easily affected by changes in water quality or increased suspended sediments, but if these alterations make habitat less suitable for turtles and hinder their capability to forage, eventually they would tend to leave or avoid these less desirable areas (Ruben and Morreale 1999).

Marine debris (e.g., discarded fishing line, lines from boats, plastics) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990). It is anticipated that marine debris will continue to impact listed species in the action area.

Sources of contamination in the action area include atmospheric loading of pollutants, stormwater runoff from coastal development, groundwater discharges, and industrial development. Chemical contamination may have an effect on listed species reproduction and survival. While the effects of contaminants on sea turtles is relatively unclear, pollution may also make sea turtles more susceptible to disease by weakening their immune systems.

INTEGRATION AND SYNTHESIS OF EFFECTS

NOAA Fisheries has determined that the ACOE's maintenance dredging of the Cape Henry, York Spit, York River Entrance and Rappahannock Shoal Channels, may affect loggerhead, leatherback, green, Kemp's ridley, and hawksbill sea turtles, shortnose sturgeon, and/or right, humpback, and fin whales by either removing and altering the availability of the prey resources they utilize, physically entraining them in the dredge, relocating sea turtles out of their preferred habitat, injuring or killing sea turtles during trawling, and/or colliding with them during vessel operations.

Based on past dredging activities using the ACOE's proposed practices and other available information, NOAA Fisheries has anticipated that loggerhead and Kemp's ridley sea turtles are the most likely species to be injured and killed as a result of these activities. Specifically, based on incidental turtle takes in previous dredging activities, NOAA Fisheries anticipates that 18 loggerheads and 4 Kemp's ridleys could be taken annually in maintenance dredging in all four channels involving up or equal to 5 million cy of material. For maintenance dredging involving up or equal to 3 million cy of material in all four channels, NOAA Fisheries anticipates that 10 loggerhead and 2 Kemp's ridley sea turtles could be taken. NOAA Fisheries further anticipates that 4 loggerhead and 1 Kemp's ridley sea turtle could be entrained during maintenance dredging activities that will remove up to 1 million cy annually in the channels considered in this opinion. NOAA Fisheries anticipates that one green turtle could be entrained annually during any amount of maintenance dredging in all four channels. Leatherbacks and hawksbill sea turtles are not anticipated to be captured by the dredge. Relocation trawling conducted in association with

dredging may result in the take of 120 live, uninjured sea turtles (a combination of loggerhead, Kemp's ridley, leatherback, or green turtles), and one dead sea turtle per year.

While operational measures should be implemented to minimize the take of sea turtles to the extent possible, the loss of a maximum of 19 loggerhead and 5 Kemp's ridley sea turtles during maintenance dredging and relocation trawling would represent a small percentage of these populations. This is also the worst case scenario, as maintenance dredging may not involve the maximum amount of dredge material stated in the project description section (and thus incidental take) in any given year in the future and relocation trawling may not need to be completed to the extent analyzed here. It is possible that a smaller amount of dredging will occur in any given year. Further, the estimation of the amount of take on the population is conservative since the loss of turtles during these dredging activities are not likely limited to adult females, the only segment of the population, or subpopulation, for which NOAA Fisheries has any population estimates. Even if all of the turtles anticipated to be entrained and killed were juveniles or reproductive females, NOAA Fisheries does not anticipate these losses to appreciably reduce the likelihood of survival and recovery of loggerhead, Kemp's ridley, green, or leatherback sea turtles.

Although never documented, it is possible that dredge vessels could collide with sea turtles or large whales when their presence overlaps. In particular, right, humpback, and fin whales may be affected by the vessels transiting the action area during the disposal phase of these operations, given the potential for collisions with these large whales. While collisions are considered unlikely, a reduction in the speed at which the vessels will be traveling and the practice of maintaining a bridge watch would help reduce the possibility of these interactions.

The physical removal of sediments and associated epifauna from the dredge sites could reduce the availability of prey in the dredged areas, but NOAA Fisheries believes these reductions will be localized and temporary, and foraging turtles and shortnose sturgeon will not be limited by the reductions.

Due to their rare occurrence in the action area, NOAA Fisheries does not anticipate shortnose sturgeon to be taken by the dredging operations.

CONCLUSION

After reviewing the best available information on the status of endangered and threatened species under NOAA Fisheries jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is NOAA Fisheries' biological opinion that the maintenance dredging operations in the Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channel may adversely affect but are not likely to jeopardize the continued existence of the right, humpback, or fin whale; loggerhead, leatherback, Kemp's ridley, green, or hawksbill sea turtle; or shortnose sturgeon. Because no critical habitat is designated in the action area, none will be affected by the project.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NOAA Fisheries to include any act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering. Harass is defined by FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by ACOE so that they become binding conditions for the exemption in section 7(o)(2) to apply. ACOE has a continuing duty to regulate the activity covered by this Incidental Take Statement. If ACOE (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, ACOE must report the progress of the action and its impact on the species to the NOAA Fisheries as specified in the Incidental Take Statement [50 CFR §402.14(I)(3)].

Amount or extent of take

While it is difficult to ascertain future take of sea turtles, NOAA Fisheries based the anticipated take levels on previous sea turtle takes during 2001/2002 Cape Henry Channel maintenance dredging and 2000/2001 Thimble Shoal Channel dredging, the level of take anticipated in previous BOs, the distribution and number of sea turtles in the Chesapeake Bay, and the magnitude of and operational measures employed by the dredging projects. The anticipated level of take for maintenance dredging in Cape Henry, York Spit, York River Entrance and Rappahannock Shoal Channels was determined based upon the greatest estimated amount of material to be dredged annually in all four channels combined, and two lesser amounts of material to be dredged:

- During any given calendar year, if the amount of dredged material to be removed equals 5 million cy or less (and is above 3 million cy) in either one or a combination of the four channels considered in this opinion, NOAA Fisheries anticipates that maintenance dredging operations may result in the observed take of 18 loggerhead and 4 Kemp's ridley sea turtles.

- During any given calendar year, if the amount of dredged material to be removed equals 3 million cy or less (and is above 1 million cy) in either one or a combination of the four channels considered in this opinion, NOAA Fisheries anticipates that maintenance

dredging operations may result in the observed take of 10 loggerhead and 2 Kemp's ridley sea turtles.

- During any given calendar year, if the amount of dredged material to be removed equals 1 million cy or less in either one or a combination of the four channels considered in this opinion, NOAA Fisheries anticipates that maintenance dredging operations may result in the observed take of 4 loggerhead and 1 Kemp's ridley sea turtles.

- During any given calendar year, NOAA Fisheries anticipates that maintenance dredging operations may result in the observed take of one green turtle during any amount of maintenance dredging in all four channels.

The incidental level of turtle take in the hopper dredge is anticipated to be fresh dead. No incidental take for hawksbill or leatherback sea turtles is anticipated in the dredging operations as these species are relatively unlikely to be prevalent in the action area and interactions with the dredge are not expected.

NOAA Fisheries also expects that the maintenance dredging may take an additional unquantifiable number of previously dead sea turtle parts. While decomposed animals taken in federal operations are considered to be takes, as the possession of a listed species is considered a take, NOAA Fisheries recognizes that decomposed sea turtles may be taken in dredging operations that may not necessarily be related to the dredging activity itself. Theoretically, if dredging operations are conducted properly, no takes of sea turtles should occur as the turtle draghead defector should push the turtles to the side and the suction pumps should be turned off whenever the dredge draghead is away from the substrate. However, due to certain environmental conditions (e.g., rocky bottom, uneven substrate), the dredge draghead may periodically lift off the bottom and entrain previously dead sea turtle parts (as well as live turtles) that may be on the bottom through the high level of suction. A sea turtle take will not be considered related to dredge operations and count towards the above referenced anticipated take level if the condition of the specimen is in an advanced state of decay[4] and if the specimen is a turtle part. Provided that NOAA Fisheries concurs with the ACOE's determination regarding the stage of decomposition, condition of the specimen, and likely cause of mortality, the take will not be attributed to the incidental take level for this project.

As stated in the reasonable and prudent measures and terms and conditions of this Incidental Take Statement, relocation trawling may occur under certain circumstances prior to or during dredging. NOAA Fisheries expects that relocation trawling in any of the channels combined may annually take an additional 120 live uninjured sea turtles (either loggerheads, Kemp's ridleys, leatherbacks, or greens, or a combination thereof). NOAA Fisheries further anticipates that one lethal take of a sea turtle (either a loggerhead, Kemp's ridley, leatherback, or green)

[4]While subject to some interpretation by the observer, a non-fresh dead animal may exhibit the following characteristics: foul odor; necrotic, dark or decaying tissues; sloughing of scutes; evident bloating; pooling of old blood; atypical coloration; and opaque or sunken eyes. A fresh dead animal may exhibit the following characteristics: little to no odor; edible condition; fresh blood present; fresh (not necrotic, pink/healthy color) tissue, muscle, or skin; no bloating; color consistent with live animal; eyes clear; and live barnacles.

may occur during relocation trawling. Most turtles taken in these trawling activities are not expected to be killed or injured due to the short duration of the tow times (15 to 30 minutes per tow) and specific operating protocol. While relocating sea turtles may invoke a degree of stress on the animals, the level of stress should be minimized by an expedited and proper handling time. Additionally, the capture of a live turtle in a trawl is likely less harmful to the species as compared to a sea turtle being entrained in a dredge draghead. The number of takes anticipated was based upon the maximum number of sea turtles taken in 2002 trawling operations in Cape Henry and York Spit Channels (15 turtles in approximately 1 month) and the number of months when sea turtles may be present in Virginia (8 months total). Thus, 120 live sea turtles (either loggerheads, Kemp's ridleys, leatherbacks, or greens, or a combination thereof) are anticipated to be taken during any relocation trawling deemed necessary during maintenance dredging operations in any of the four channels.

The distribution of shortnose sturgeon in Virginia waters is relatively unknown and the furthest southern recorded capture of a shortnose sturgeon in the Chesapeake Bay is in the mouth of the York River. While NOAA Fisheries must employ a conservative approach to management and consider the species to be in the area, it is difficult to determine the abundance of this species in the action area and how the proposed project will impact shortnose sturgeon. Due to the lack of information about shortnose sturgeon distribution in Virginia waters and the low likelihood that the dredge activities will interact with this species, no incidental take will be designated for shortnose sturgeon at this time. No incidental take of any listed marine mammal is anticipated for this project.

Effect of the take

In the accompanying BO, NOAA Fisheries evaluated the effects of this level of anticipated take on the above listed species. NOAA Fisheries has determined that these interactions, should they occur, are not likely to jeopardize the continued existence of these species, or the destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

NOAA Fisheries has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles. Although no takes of other listed species are authorized at this time, these measures must be undertaken in a manner which ensures detection of takes of these other species so that appropriate reinitiation action can be taken.

1. The ACOE shall minimize dredging activities from April 1 to November 30.

2. The ACOE shall ensure that between April 1 and November 30, hopper dredges are outfitted with state-of-the-art sea turtle deflectors on the draghead and operated in a manner that will reduce the risk of interactions with sea turtles which may be present in the dredge area.

3. The ACOE shall ensure that dredges are equipped and operated in a manner that provides endangered/threatened species observers with a reasonable opportunity for detecting interactions with listed species and that provides for handling, collection, and

resuscitation of turtles injured during project activity. Full cooperation with the endangered/threatened species observer program is essential for compliance with the ITS.

4. The ACOE shall enact measures that would reduce the number of sea turtles in the dredging channel so that the possibility of entrainment would be minimized.

5. The ACOE shall develop and follow a system to provide timely reporting to NOAA Fisheries on any takes of protected species.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the ACOE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. When possible, dredging must not be completed from April 1 to November 30, that is, the time period when turtle abundance is highest in Virginia waters. If dredging occurs during this time frame, ACOE should take particular care to minimize activity during the sea turtles' migration period into the Bay during the spring (approximately May 1 to June 30) and fall (approximately September 1 to October 30), the time frame when most of the Chesapeake Bay resident turtles are believed to be passing through the mouth of the Bay and in the vicinity of the channels. If dredging is to be conducted from April 1 to November 30 (the impacts of which were analyzed in this BO), the ACOE must inform NOAA Fisheries at least 3 months before dredging commences, noting the anticipated amount to be dredged from all four channels, explaining why dredging must occur during the anticipated time frame, and identifying the specific measures to be taken to reduce potential sea turtle takes. The ACOE must also inform NOAA Fisheries of the commencement of operations 3 days prior to the actual start date and of the completion date within 3 days after the actual end of operations.

2. If dredging occurs between April 1 and November 30, hopper dredges must be equipped with the rigid deflector draghead as designed by the ACOE Engineering Research and Development Center, formerly the Waterways Experimental Station (WES), or if that is unavailable, a rigid sea turtle deflector attached to the draghead. Deflectors must be checked and/or adjusted by a designated expert prior to a dredge operation to insure proper installment and operation during dredging. The deflector must be checked after every load throughout the dredge operation to ensure that proper installation is maintained. Since operator skill is important to the effectiveness of the WES-developed draghead, operators must be properly instructed in its use. Dredge inspectors must ensure that all measures to protect sea turtles are being followed during dredge operations.

3. If dredging occurs during the period of April 1 through November 30, the ACOE must adhere to the attached "Monitoring Specifications for Hopper Dredges" with trained NOAA Fisheries-approved sea turtle observers, in accordance with the attached "Observer Protocol" and "Observer Criteria" (Appendix C). NOAA Fisheries-approved observers must be on hopper dredges once surface waters reach or exceed 11° C, or

during the period of April 1 through November 30 (whichever occurs first), of any year to monitor the hopper spoil, inflow, screening and dragheads for sea turtles and shortnose sturgeon and their remains.

4. As stated in Appendix C, observer coverage must be sufficient for 100% monitoring of hopper dredging operations. All biological material found in the intake screens must be documented by the observer.

5. As with any incidental take, if a decomposed turtle or turtle part is taken in dredging operations, an incident report must be completed and the specimen must be photographed (Appendix H). Any turtle parts that are considered 'not fresh' (i.e., they were obviously dead prior to the dredge take and will not be counted towards the ITS) must be frozen and transported to a nearby stranding or rehabilitation facility for review. The ACOE must submit the incident report for the decomposed turtle part, as well as photographs, to NOAA Fisheries within 24 hours of the take (see Appendix C) and request concurrence that this take should not be attributed to the Incidental Take Statement. NOAA Fisheries shall have the final say in determining if the take should count towards the Incidental Take Statement.

6. The ACOE must ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that will minimize takes of sea turtles. Training shall include measures discussed in Appendix C. It shall be the goal of each hopper dredging operation to establish operating procedures that are consistent with those that have been used during hopper dredging in other regions of the coastal United States, and which have proven effective in reducing turtle/dredge interactions. Therefore, Glynn Banks (ACOE, Vicksburg, MS, [601] 634-3597), or a person with a similar level of expertise on this matter, shall be involved both in dredge operation training, and the installation, adjustment and monitoring of the rigid deflector draghead assembly.

7. It is unlikely that sea turtles will survive entrainment in a hopper dredge, as the turtles found in the dragheads are almost always dead, dying, or dismembered. However, a few turtles have escaped hopper dredges without apparent injuries. A sub-adult loggerhead was removed from dredge gear unharmed in Savannah, Georgia and an occasional small green turtle has been known to survive (Slay 1995, Magnuson et al. 1990). The procedures for handling live sea turtles are outlined in case the unlikely event should occur. All permit holders must follow the sea turtle handling techniques specified in Appendices C and D.

8. A sea turtle trawling and relocation survey must be initiated following the take of two (2) turtles (any species) in a 24-hour time period or four (4) turtles within a two month period, or in other circumstances that NOAA Fisheries deems appropriate. Such circumstances include a large number of cumulative takes during the project (e.g., ½ of the anticipated incidental take level), unseasonably warm water temperatures (greater than 11° C), or other evidence indicating that protected species presence may be high (e.g., aerial or in-water surveys documenting a large number of sea turtles in the channel areas). All trawls must follow the standard protocol developed and used by the ACOE

South Atlantic Division (Appendix E). The trawling and relocation survey must be initiated within 24 hours of the incidental take or the ACOE must suspend dredging operations until such trawling can be initiated. Trawling must continue for at least 5 consecutive days, unless precluded by inclement weather, after which NOAA Fisheries may continue or suspend the survey. After the trawling survey is completed, the NOAA Fisheries and ACOE shall immediately discuss the results of the trawling to determine if additional measures are needed to relocate turtles found in the channel.

9. The results of each turtle take from the trawling survey must be recorded on the Sea Turtle Tagging Data Report (Appendix F), or a similar form including the same information. The preliminary results of the trawling survey must be submitted to NOAA Fisheries immediately after the survey is completed so that NOAA Fisheries can determine if additional trawling is warranted. A final report summarizing the results of the trawling and any takes of listed species must be submitted to NOAA Fisheries within 30 working days of completion of the trawling survey.

10. A final report summarizing the results of the dredging and any takes of listed species must be submitted to NOAA Fisheries (at the addresses specified in Appendix C) within 30 working days of completion of each cycle of the project.

11. Vessels must comply with the ESA 500-yard approach regulations for right whales. To minimize risks from vessel operations around other listed species, the dredge vessel must not intentionally approach such other listed species closer than 100 yards when in transit. When species are present vessels must, except when precluded by safety requirements, follow the advice of the onboard NOAA Fisheries-approved observer to avoid collisions.

12. If sea turtles are present during dredging or material transport, vessels transiting the area must post a bridge watch, avoid intentional approaches closer than 100 yards when in transit, and reduce speeds to below 4 knots.

13. If the take of loggerhead sea turtles approaches ½ of the anticipated incidental take level (e.g., 9 turtles for 5 million cy) during any project cycle, the ACOE must immediately contact NOAA Fisheries at (978) 281-9328, ext. 6525, to review the situation. At that time, the ACOE must provide NOAA Fisheries with information on the amount of material dredged thus far and the amount remaining to be dredged that year. Also at that time, the ACOE should contact NOAA Fisheries to discuss whether any new management measures could be implemented to prevent the total incidental take level from being reached.

NOAA Fisheries anticipates that no more than 18 loggerheads and 4 Kemp's ridleys will be taken annually in maintenance dredging involving up or equal to 5 million cy of material in Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels. For maintenance dredging involving up or equal to 3 million cy of material in all four channels, NOAA Fisheries anticipates that no more than 10 loggerhead and 2 Kemp's ridley sea turtles will be taken. NOAA Fisheries further anticipates that no more than 4 loggerhead and 1 Kemp's ridley sea turtle will be entrained during maintenance dredging activities that will remove up or equal to 1

million cy annually in the channels considered in this opinion. NOAA Fisheries anticipates that one green turtle will be entrained annually during any amount of maintenance dredging in all four channels. Relocation trawling is anticipated to take 120 live uninjured sea turtles (loggerheads, Kemp's ridleys, leatherbacks, or greens), and one dead turtle. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of and monitor incidental take that is expected from the proposed action. If, during the course of the project, this level of incidental take is exceeded, the additional level of take would represent new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided above.

CONSERVATION RECOMMENDATIONS

In addition to section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of listed species, section 7(a)(1) of the ESA places a responsibility on all federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species". Conservation Recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. When endangered species observers are required on hopper dredges (April 1 to November 30), 100% overflow screening is recommended. While monitoring 100% of the inflow screening is required as a term and condition of this project's Incidental Take Statement, observing 100% of the overflow screening would ensure that any takes of sea turtles are detected and reported.

2. To facilitate future management decisions on listed species occurring in the action area, ACOE should maintain a database mapping system to: 1) create a history of use of the geographic areas affected; and, 2) document endangered/threatened species presence/interactions with project operations.

3. The ACOE should support ongoing and/or future research to determine the abundance and distribution of sea turtles in Virginia waters.

4. The ACOE should investigate, support, and/or develop additional technological solutions to further reduce the potential for sea turtle takes in hopper dredges. For instance, NOAA Fisheries recommends that the ACOE coordinate with other Southeast Districts, the Association of Dredge Contractors of America, and dredge operators regarding additional reasonable measures they may take to further reduce the likelihood of sea turtle takes. The diamond-shaped pre-deflector, or other potentially promising pre-deflector designs such as tickler chains, water jets, sound generators, etc., should be developed and tested and used where conditions permit as a means of alerting sea turtles and sturgeon of approaching equipment. New technology or operational measures that would minimize the amount of time the dredge is spent off the bottom in conditions of uneven terrain should be explored. Pre-deflector use should be noted on observer daily log sheets, and annual reports to NOAA Fisheries should note what progress has been made on deflector or pre-deflector technology and the benefits of or problems associated

with their usage. NOAA Fisheries believes that development and use of effective pre-deflectors could reduce the need for sea turtle relocation trawling.

5. New approaches to sampling for turtle parts should be investigated. The ACOE should seek continuous improvements in detecting takes and should determine, through research and development, a better method for monitoring and estimating sea turtle takes by hopper dredges. Observation of overflow and inflow screening appears to be only partially effective and may provide only minimum estimates of total sea turtle mortality. NOAA Fisheries believes that some listed species taken by hopper dredges may go undetected because body parts are forced through the sampling screens by the water pressure (as seen in 2002 Cape Henry dredging) and are buried in the dredged material, or animals are crushed or killed but not entrained by the suction and so the takes may go unnoticed (or may subsequently strand on nearby beaches). The only mortalities that are documented are those where body parts either float, are large enough to be caught in the screens, and can be identified to species.

6. NOAA Fisheries recommends that all sea turtles entrained in hopper dredge dragheads, and sea turtles captured during relocation trawling, be sampled for genetic analysis by a NOAA Fisheries laboratory. Any genetic samples from live sea turtles must be taken by trained and permitted personnel. Copies of NOAA Fisheries genetic sampling protocols for live and dead turtles are attached as Appendix I.

7. The ACOE should consider devising and implementing some method of significant economic incentives to hopper dredge operators such as financial reimbursement based on their satisfactory completion of dredging operations, or a certain number of cubic yards of material removed, or hours of dredging performed, *without taking turtles*. This may encourage dredging companies to research and develop "turtle friendly" dredging methods, more effective deflector dragheads, pre-deflectors, top-located water ports on dragarms, etc.

8. Because presence of shortnose sturgeon in the lower Chesapeake Bay could substantially affect the conclusions in future section 7 consultations, the ACOE should coordinate and collaborate with the NOAA Fisheries and the USFWS on sturgeon research efforts in Virginia.

9. For every year when dredging activities are planned for winter months, the ACOE should contact the marine mammal staff at the Virginia Marine Science Museum in order to obtain information on whale sightings in the area.

10. When whales are present in the action area, vessels transiting the area should post a bridge watch, avoid intentional approaches closer than 100 yards (or 500 yards in the case of right whales) when in transit, and reduce speeds to below 4 knots.

REINITIATION OF CONSULTATION

This concludes formal consultation on maintenance dredging in the Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal Channels in the Virginia waters of the Chesapeake Bay. As provided in 50 CFR 402.16, reinitiation of formal consultation is required

where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) a new species is listed or critical habitat designated that may be affected by the action; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered. In instances where the amount or extent of incidental take is exceeded, the ACOE must immediately request reinitiation of formal consultation.

Table 3. Incidents of dredge related takes in Cape Henry, York Spit, York River Entrance and Rappahannock Shoals Channels.

Project	*Location*	*Date/Time*	*Temp (surface unless noted otherwise)*	*Spp*	*Length/width**	*Condition of screening*	*Comments***
Cape Henry Channel, VA	lat/long not reported	9/26/01 1930 hrs	73 F	Cc	~46 cm SCL; plastron ~28 cm L; head width 12 cm	Good, draghead deflector used	**Fresh** turtle in inflow forward starboard basket. Most of carapace missing, no viscera, fresh tissues with blood inside, no odor, live hogchoker in back of mouth behind tongue.
Cape Henry Channel, VA	lat/long not reported	10/10/01 1532 hrs	63 F	Lk	16 in SCL; 15 in SCW; plastron 15 in L, 15 in W; head width 3.5 in.	Good, draghead deflector used	**Fresh** turtle in inflow forward port basket. Internal organs missing, carapace and plastron cracked, unexposed muscle healthy, no odor, live small flatfish in mouth.
Cape Henry Channel, VA	lat/long not reported	10/17/01 1420 hrs	65 F	Cc	63 cm SCL; 58 cm SCW	Good, draghead deflector used	Pieces of carapace and attached skin, intestine, found in inflow forward starboard basket. Skin appears healthy, no odor. Considered **fresh** take.
Cape Henry Channel, VA	36 58 N, 75 59.5 W	11/2/01 1315 hrs	62 F	Un	n/a	Good, draghead deflector used	Rib bone found in inflow forward starboard basket. Appeared old, no tissue attached. **Determined not related to dredge activity.**
Cape Henry Channel, VA	36 59 N, 76 00 W	4/24/02 1114 hrs	57 F (surface) 56 F (column)	Cc	~68.6 cm SCL; plastron ~38.1 cm L; head W 7.8 cm	Good, draghead deflector used	**Fresh** take in 3 major pieces, included head, 3 flippers. Majority of carapace missing, cavity mostly empty. Recovered from aft inflow screening basket.
Cape Henry Channel, VA	36 59 N, 76 01 W	5/13/02 1000 hrs	66 F (surface)	Cc	~64 cm SCL; plastron ~56 cm; head width ~16 cm	Good, draghead deflector used	**Fresh** take of subadult/adult, short tail. Fragmented specimen, all flippers present, some pieces of carapace and plastron, head damaged and major trauma to dorsal side.
Cape Henry Channel, VA	36 59N, 76 01W (location at end of load)	5/18/02 2100 hrs	65 F (surface)	Cc	~72 cm SCL; plastron ~52 cm L, ~49 cm W; head width ~16 cm	Good, draghead deflector used	**Fresh** take with good color, no bloating, no odor. Most plastron present, 65% of carapace but had to be pieced together. Head whole, short tail. Mud filled, mascerated specimen. At least 20 rocks found with turtle.

Cape Henry Channel, VA	36 59.91 N, 76 01.29 W	5/23/02 0615 hrs	61 F (surface and column)	Cc	~70 cm SCL; ~60 cm SCW	Good, draghead deflector used	**Fresh** dead animal, only portion of carapace/plastron recovered. Some fresh muscle attached, no odor. Several cracks in carapace. Uncertain if could have been a recent ship strike.
Cape Henry Channel, VA	36 59.91 N, 76 01.29 W	6/1/02 2112 hrs	72 F (surface), 71 F (column)	Cm	27 cm SCL; 24 cm SCW; plastron 24 cm L, 22 cm W; head width 5 cm	Good, draghead deflector used	**Fresh** dead animal, entire turtle recovered except for few small portions of carapace. Long crack down carapace, abraded regions on plastron and head. Blood present, internal organs intact, first exam found minimal eye reflex and muscular contraction (stopped 1 hour later). Turtle likely taken in last 2 cuts (~2015-2115).
Cape Henry Channel, VA	36 59.9 N, 76 01.2 W	6/4/02 2230 hrs	71 F	Cc	~60 cm SCL, ~40-50 cm SCW	Good, draghead deflector used	Recovered 32x30 cm piece of carapace. **Fresh** take determined due to pink tissue and blood near vertebrae, lack of odor. Sharp protusions of bone.
Cape Henry Channel, VA	36 59.8 N, 76 01.2 W	8/16/02 2110 hrs	79 F (surface) 78 F (column)	Cc	n/a	Good, draghead deflector used	Front flippers only, length ~15 in. width ~4 in. Strong odor, probably **dead prior to take**. Pale yellow/white color. No blood and attached tissue black. Species ID confirmed by VMSM.
York Spit Channel, VA	37 14.2 N, 76 08.3 W	8/26/02 1850 hrs	82.5 F	Cc	68.6 cm SCL; 53.3 cm SCW; plastron 49.5 cm L, 41.9 cm W; head width 14 cm	Good, draghead deflector used	Recovered from starboard draghead and inflow. **Fresh** take, specimen virtually intact. Fresh blood, no odor/bloating. Large crack running entire length of carapace. Barnacles present and alive. Some internal organs missing; digestive tract recovered separately.
York Spit Channel, VA	37 14.1 N, 76 08.2 W	9/3/02 0645 hrs	77 F	Cc (sub-adult)	~59.7 cm SCL; ~52.1 cm SCW; plastron 48.3 cm L, 29.2 cm W; head width 13.3 cm	Good, draghead deflector used	Recovered from overflow ("weir"). **Fresh** take, specimen in 3 parts. Fresh blood/tissue, no odor. Only part of carapace and internal organs missing. Some intestine recovered. VMSM picked up animal. Modified dredge (chained inflow doors) to prevent future takes in same manner.
York Spit Channel, VA	37 12.5 N, 76 08.7 W	9/13/02 0700 hrs	75 F	Lk	47.5 cm SCL; 46 cm SCW; plastron 37.5 cm L, 48.1 cm W; head width 10.6 cm	Good, draghead deflector used	Turtle **still alive** but in poor condition. Most of right side of carapace missing; deep wound inside right flipper. Multiple cracks on carapace and plastron; turtle bleeding profusely. Transported to VMSM within 2 1/2 hrs; at that time turtle was limp and not breathing. Recovered from fore inflow box.

York Spit Channel, VA	36 11.5 N, 76 09.2 W	9/18/02 0830 hrs	76 F	Cc	~70 cm SCL; ~57 cm SCW; plastron ~53 cm L, ~57 cm W; head length ~18 cm	Good, draghead deflector used	Small part of carapace/plastron, lung, intestine, and stomach recovered from fore starboard inflow box. Bright red blood from intestines, indicating **fresh** take. Stomach contained fresh horseshoe crabs, and live worms in intestines.
York Spit Channel, VA	~37 13.4 N, 76 08.4 W	9/25/02 1945 hrs	76 F	Cc	~72 cm SCL; ~56 cm SCW	Good, draghead deflector used	Two small pieces of carapace with tissue attached recovered from fore starboard inflow box. Tissue not necrotic, no odor, live barnacles on carapace, indicating **fresh** take.
York Spit Channel, VA	~37 12.4 N, 76 08.8 W	9/28/02 0805 hrs	76 F	Cc	~74 cm SCL; ~64 cm SCW	Good, draghead deflector used	Two consecutive loads took same turtle. First load recovered piece of carapace with tissue, ribs, intestine, stomach. No odor, no necrotic tissue, live barnacles, blood, indicating **fresh** take. Second load recovered posterior section. Marginal scutes matched previously identified ones, identifying as same turtle.
York Spit Channel, VA	37 13.12 N, 76 08.58 W	10/3/02 1930 hrs	75 F	Cc	~47 cm SCL; ~35 cm SCW; plastron ~45 cm L, ~30 cm W	Good, draghead deflector used	Right portion of carapace and plastron, tissue, and portions of intestine recovered from port inflow box and aft wier. Good condition, not necrotic, no odor, live barnacles, indicating **fresh** take. Plastron contained several notable scratches.
York Spit Channel, VA	~37 10.67 N, 76 09.20 W	10/8/02 1835 hrs	75 F	Cc	not able to be estimated	Good, draghead deflector used	Small section of central and lateral scutes, tissue, internal organs, portion of rib, backbone, 1 attached flipper bone, recovered from starboard forward inflow screen. Good condition, not necrotic, no odor, fresh blood, live barnacles, indicating **fresh** take. Specimen too small to give accurate size.
York Spit Channel, VA	37 9.84 N, 76 9.08 W	10/9/02 0920 hrs	75 F	Cc	~43.6 cm SCL; ~49 cm SCL	Good, draghead deflector used	Several parts of turtle found in consecutive loads. Same coloration and recovered parts fit together. Good condition, not necrotic, no odor, live barnacles, indicating **fresh** take.

York Spit Channel, VA	37 09.45 N, 76 08.99 W	10/16/02 1950 hrs	69 F	Cc	plastron 48 cm L, ~31 cm W	Good, draghead deflector used	Plastron and attached internal organs recovered from starboard forward inflow screen. Intestines recovered on aft wier. Good condition, not necrotic, no odor, live barnacles, indicating **fresh** take.
York Spit Channel, VA	37 09.97 N, 76 09.06 W	10/19/02 1840 hrs	66 F	Cc	plastron ~60 cm L, ~43 cm W, head W 15 cm, 115 cm from upper tomium to tail.	Good, draghead deflector used	Plastron, flippers, head, portions of carapace recovered from starboard forward inflow box. Determined **not to be a fresh take** due to severe slothing of scutes on head and plastron, decayed white carapace fragments, foul odor, necrotic tissue with pooling of blood, opaque and swollen eyes.
York Spit Channel, VA	37 10.43 N, 76 09.13 W	10/20/02 0926 hrs	65 F	Cc	head W 15 cm	Good, draghead deflector used	Head (upper tomium) with encrusted barnacles recovered from starboard forward inflow screen. Determined **not to be a fresh take** due to slothing of scales, decaying composition, foul odor, opaque eyes.
Cape Henry Channel, VA	36 59.68 N, 76 0.87 W	10/27/02 1845 hrs	64 F	Lk	38.2 cm SCL; 32 cm SCW; plastron 36.1 cm L, 32 cm W; head width ~8 cm	Good, draghead deflector used	Intact specimen, except for missing portion of carapace and internal organs, recovered from port forward inflow screen. Head and right front flipper detached from body. No odor, tissue not necrotic, blood around eyes and carapace, indicating **fresh take.**
Cape Henry Channel, VA	36 59.76 N, 76 01.15 W	10/30/02 1100 hrs	60 F (surface) 58 F (column)	Cc	n/a	Good, draghead deflector used	Two front flippers and one partial rear flipper connected by skin and tissue observed at aft overflow. No other body parts observed. Observed after load was dumped. Specimen hung between columns of aft overflow pipes, which is typically subsurface. Weight of specimen resulted in dislodge into water and was not recovered. Passed through inflow and overflow screening, apparently from force of water. Determined to be a **fresh take** due to observed condition of flippers and tissue.

* SCL = straight carapace length; SCW = straight carapace width; CCL = curved carapace length

** The Comments section includes information provided by the observer contractor, and not necessarily observations by NMFS.

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APPENDIX A

Map of Project Location

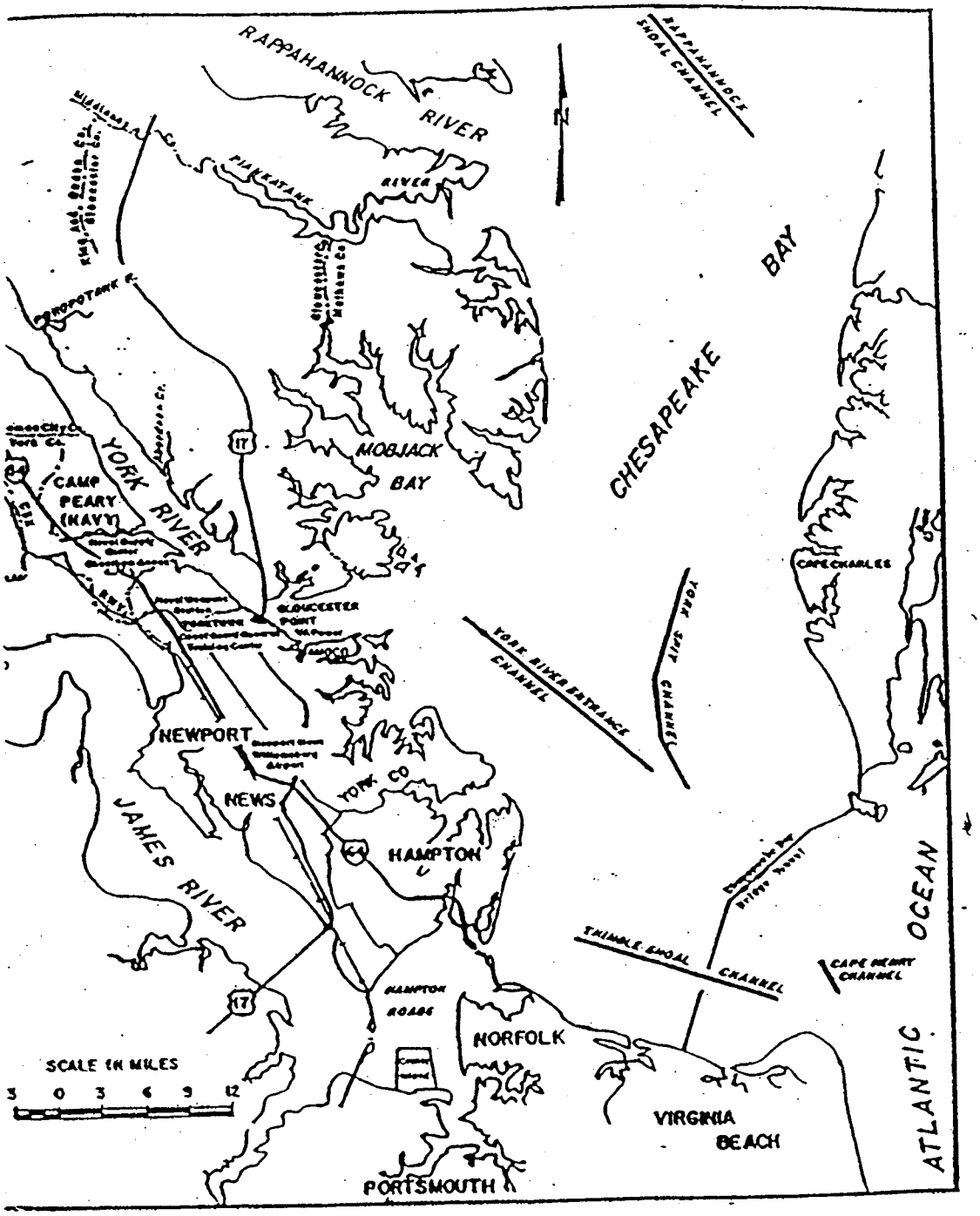
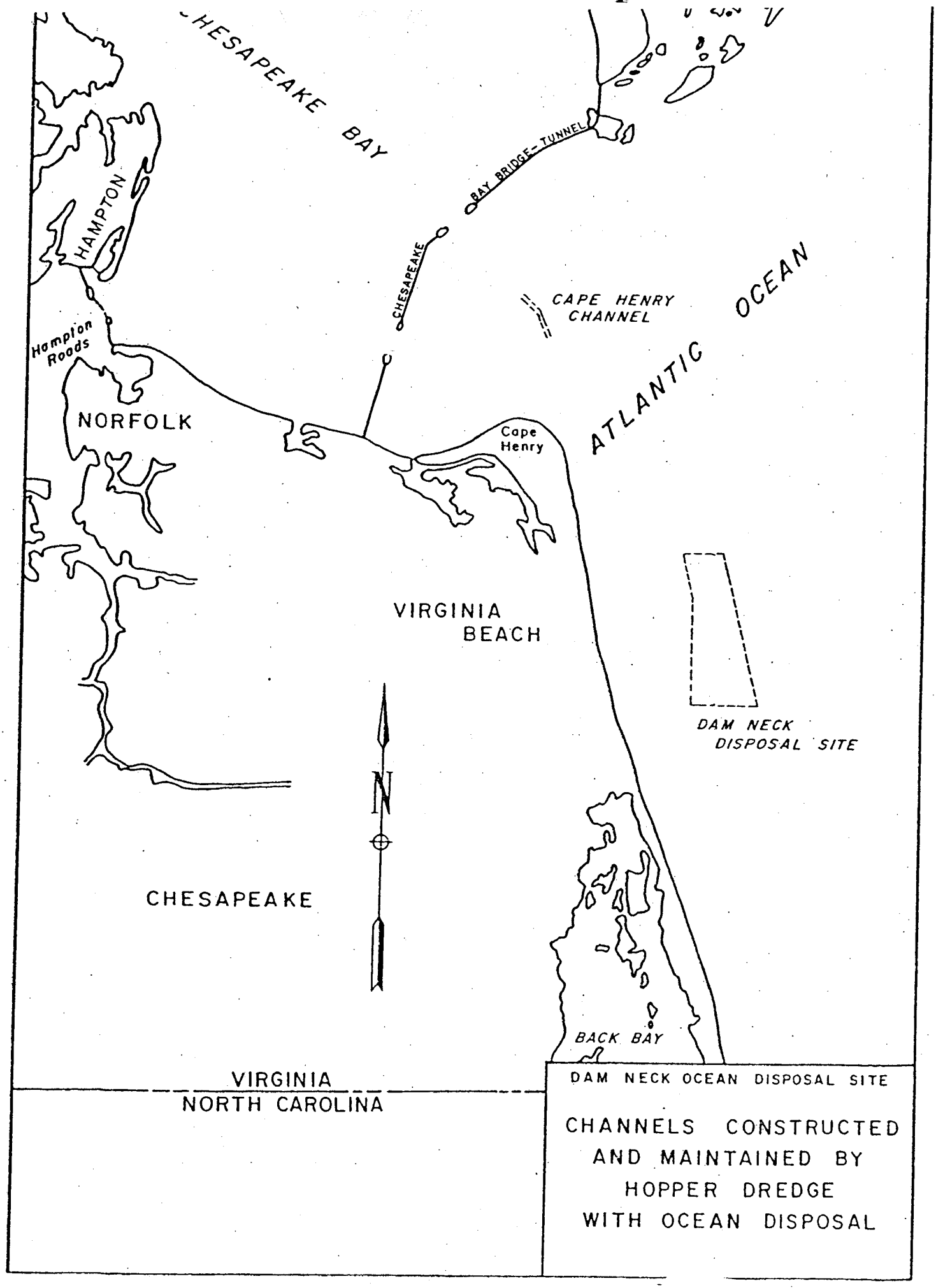


Figure 1. Lower York River Study Area

1: Figure 1 in US Army Corps of Engineers. July 1992. ...vigation Study of York River Entrance Channel. Final Detailed

APPENDIX B
Map of Dredge Disposal Location - Dam Neck Site


CHESAPEAKE BAY
BAY BRIDGE-TUNNEL
HAMPTON
CHESAPEAKE
CAPE HENRY CHANNEL
ATLANTIC OCEAN
Hampton Roads
NORFOLK
Cape Henry
VIRGINIA BEACH
DAM NECK DISPOSAL SITE
N
CHESAPEAKE
BACK BAY
VIRGINIA
NORTH CAROLINA
DAM NECK OCEAN DISPOSAL SITE
CHANNELS CONSTRUCTED AND MAINTAINED BY HOPPER DREDGE WITH OCEAN DISPOSAL

APPENDIX C.

MONITORING SPECIFICATIONS FOR HOPPER DREDGES

I. EQUIPMENT SPECIFICATIONS

A. Baskets or screening

Baskets or screening must be installed over the hopper inflows with openings no smaller than 4 inches by 4 inches to provide 100% coverage of all dredged material and shall remain in place during all dredging operations between April 1 and November 30 of any calendar year. Baskets/screening will allow for better monitoring by observers of the dredged material intake for sea turtles and their remains. The baskets or screening must be safely accessible to the observer and designed for efficient cleaning.

B. Draghead

The draghead of the dredge shall remain on the bottom **at all times** during a pumping operation, except when:

1) the dredge is not in a pumping operation, and the suction pumps are turned completely off;

2) the dredge is being re-oriented to the next dredge line during borrow activities; and

3) the vessel's safety is at risk (i.e., the dragarm is trailing too far under the ship's hull).

At initiation of dredging, the draghead shall be placed on the bottom during priming of the suction pump. If the draghead and/or dragarm become clogged during dredging activity, the pump shall be shut down, the dragarms raised, whereby the draghead and/or dragarm can be flushed out by trailing the dragarm along side the ship. If plugging conditions persist, the draghead shall be placed on deck, whereby sufficient numbers of water ports can be opened on the draghead to prevent future plugging.

Upon completion of a dredge track line, the drag tender shall:

1) throttle back on the RPMs of the suction pump engine to an idling speed (e.g., generally less than 100 RPMs) **prior to** raising the draghead off the bottom, so that no flow of material is coming through the pipe into the dredge hopper. Before the draghead is raised, the vacuum gauge on the pipe should read zero, so that no suction exists both in the dragarm and draghead, and no suction force exists that can impinge a turtle on the draghead grate;

2) hold the draghead firmly on the bottom with no flow conditions for approximately 10 to 15 seconds before raising the draghead; then, raise the draghead quickly off the bottom and up to a mid-water column level, to further reduce the potential for any adverse interaction with nearby turtles;

3) re-orient the dredge quickly to the next dredge line; and

4) re-position the draghead firmly on the bottom prior to bringing the dredge pump to normal pumping speed, and re-starting dredging activity.

C. Floodlights

Floodlights must be installed to allow the NOAA Fisheries-approved observer to safely observe and monitor the baskets or screens.

D. Intervals between dredging

Sufficient time must be allotted between each dredging cycle for the NOAA Fisheries-approved observer to inspect and thoroughly clean the baskets and screens for sea turtles and/or turtle parts and document the findings. Between each dredging cycle, the NOAA Fisheries-approved observer should also examine and clean the dragheads and document the findings.

II. OBSERVER PROTOCOL

A. Basic Requirement

A NOAA Fisheries-approved observer with demonstrated ability to identify sea turtle species must be placed aboard the dredge(s) being used, starting immediately upon project commencement to monitor for the presence of listed species and/or parts being entrained or present in the vicinity of dredge operations.

B. Duty Cycle

Beginning April 1, NOAA Fisheries-approved observers are to be onboard for every week of the dredging project until project completion or November 30, whichever comes first. While onboard, observers shall provide the required inspection coverage on a rotating basis so that combined monitoring periods represent 100% of total dredging through the project period.

C. Inspection of Dredge Spoils

During the required inspection coverage, the trained NOAA Fisheries-approved observer shall inspect the galvanized screens and baskets at the completion of each loading cycle for evidence of sea turtles or shortnose sturgeon. The Endangered Species Observation Form shall be completed for each loading cycle, whether listed species are present or not (Appendix G). If any whole turtles or shortnose sturgeon (alive or dead) or turtle or shortnose sturgeon parts are taken incidental to the project(s), Carrie McDaniel (978) 281-9328 ext. 6525 or Pat Scida (978) 281-9208 must be contacted within 24 hours of the take. An incident report for sea turtle/shortnose sturgeon take (Appendix H) shall also be completed by the observer and sent to Carrie McDaniel via FAX (978) 281-9394 within 24 hours of the take. Incident reports shall be completed for every take regardless of the state of decomposition. NOAA Fisheries will determine if the take should be attributed to the incidental take level, after the incident report is received. Every incidental take (alive or dead, decomposed or fresh) should be photographed,

and photographs shall be sent to NOAA Fisheries either electronically (carrie.mcdaniel@noaa.gov) or through the mail. Weekly reports, including all completed load sheets, photographs, and relevant incident reports, as well as a final report, shall be submitted to NOAA Fisheries NER, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930-2298.

D. Information to be Collected

For each sighting of any endangered or threatened marine species (including whales as well as sea turtles), record the following information on the Endangered Species Observation Form (Appendix G):

1) Date, time, coordinates of vessel
2) Visibility, weather, sea state
3) Vector of sighting (distance, bearing)
4) Duration of sighting
5) Species and number of animals
6) Observed behaviors (feeding, diving, breaching, etc.)
7) Description of interaction with the operation

E. Disposition of Parts

If any whole turtles or shortnose sturgeon (alive or dead, decomposed or fresh) or turtle or shortnose sturgeon parts are taken incidental to the project(s), Carrie McDaniel (978) 281-9328 ext. 6525 or Pat Scida (978) 281-9208 must be contacted within 24 hours of the take. All whole dead sea turtles or shortnose sturgeon, or turtle or shortnose sturgeon parts, should be photographed and described in detail on the Incident Report of Sea Turtle/Shortnose Sturgeon Mortality (Appendix H). The photographs and reports should be submitted to Carrie McDaniel, NOAA Fisheries, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930-2298. After NOAA Fisheries is notified of the take, it may instruct the observer to save the animal for future analysis if there is freezer space. Regardless, any dead **Kemp's ridley** sea turtles shall be photographed, placed in plastic bags, labeled with location, load number, date, and time taken, and placed in cold storage. Dead turtles or turtle parts will be further labeled as recent or old kills based on evidence such as fresh blood, odor, and length of time in water since death. Disposition of dead sea turtles/shortnose sturgeon will be determined by NOAA Fisheries at the time of the take notification. Unless otherwise instructed by NOAA Fisheries, other sea turtle species (loggerhead, leatherback, or green turtles) taken either whole or in parts, or any shortnose sturgeon should be disposed of (after a photograph is taken and a reporting form has been completed) by attaching a weight to the animal and dumping the specimen at the dredge spoil disposal site. If possible, a mark or tag (e.g., Inconel tag) should be placed on the carcass or part in the event that the animal is recaptured or stranded. If the species is unidentifiable or if there are entrails that may have come from a turtle, the subject should be photographed, placed in plastic bags, labeled with location, load number, date and time taken, and placed in cold storage. Dead Kemp's ridley or unidentifiable species or parts will be collected by NOAA Fisheries or NOAA Fisheries-approved personnel (contact Carrie McDaniel at (978) 281-9328 ext. 6525).

Live turtles (both injured and uninjured) should be held onboard the dredge until transported as soon as possible to the appropriate stranding network personnel for rehabilitation (Appendix D). No live turtles should be released back into the water without first being checked by a qualified veterinarian or a rehabilitation facility. Virginia and Maryland stranding network members (for rehabilitating turtles) include Mark Swingle and/or Susan Barco at the Virginia Marine Science Museum [(757)437-4949], Jack Musick at the Virginia Institute of Marine Science [(804)684-7313], and Dr. Brent Whitaker and/or David Schofield of the National Aquarium in Baltimore [(410)576-3853]. Mark Swingle/Susan Barco, Brent Whitaker/David Schofield, and Dana Hartley (NOAA Fisheries Stranding Network Coordinator: (508) 495-2090) should also be contacted immediately for any marine mammal injuries or mortalities.

III. OBSERVER REQUIREMENTS

Submission of resumes of endangered species observer candidates to NOAA Fisheries for final approval ensures that the observers placed onboard the dredges are qualified to document takes of endangered and threatened species, to confirm that incidental take levels are not exceeded, and to provide expert advice on ways to avoid impacting endangered and threatened species. NOAA Fisheries does not offer certificates of approval for observers, but approves observers on a case-by-case basis.

A. Qualifications

Observers must be able to:

1) differentiate between leatherback (*Dermochelys coriacea*), loggerhead *Caretta caretta*), Kemp's ridley *(Lepidochelys kempii*), green (*Chelonia mydas*), and hawksbill *(Eretmochelys imbricata*) turtles and their parts, and shortnose (*Acipenser brevirostrum*) and Atlantic (*Acipenser oxyrinchus oxyrinchus*) sturgeon and their parts;

2) handle live sea turtles and sturgeon and resuscitate and release them according accepted procedures;

3) correctly measure the total length and width of live and whole dead sea turtle and sturgeon species;

4) observe and advise on the appropriate screening of the dredge's overflow, skimmer funnels, and dragheads; and

5) identify marine mammal species and behaviors.

B. Training

Ideally, the applicant will have educational background in marine biology, general experience aboard dredges, and hands-on field experience with the species of concern. For observer

candidates who do not have sufficient experience or educational background to gain immediate approval as endangered species observers, the below observer training is necessary to be considered admissible by NOAA Fisheries. We can assist the ACOE by identifying groups or individuals capable of providing acceptable observer training. Therefore, at a minimum, observer training must include:

1) instruction on how to identify sea turtles and sturgeon and their parts;

2) instruction on appropriate screening on hopper dredges for the monitoring of sea turtles and sturgeon (whole or parts);

3) demonstration of the proper handling of live sea turtles and sturgeon incidentally captured during project operations. Observers may be required to resuscitate sea turtles according to accepted procedures prior to release;

4) instruction on standardized measurement methods for sea turtle and sturgeon lengths and widths; and

5) instruction on how to identify marine mammals; and

6) instruction on dredging operations and procedures, including safety precautions onboard a vessel.

APPENDIX D

Sea Turtle Handling and Resuscitation

It is unlikely that sea turtles will survive entrainment in a hopper dredge, as the turtles found in the dragheads are usually dead, dying, or dismantled. However, the procedures for handling live sea turtles follow in case the unlikely event should occur. These guidelines are adapted from 50 CFR § 223.206(d)(1).

Please photograph all turtles (alive or dead) and turtle parts found during dredging activities and complete the Incident Report of Sea Turtle Take (Appendix H).

Dead sea turtles
The procedures for handling dead sea turtles and parts are described in Appendix C-II-E.

Live sea turtles
When a sea turtle is found in the dredge gear, observe it for activity and potential injuries.

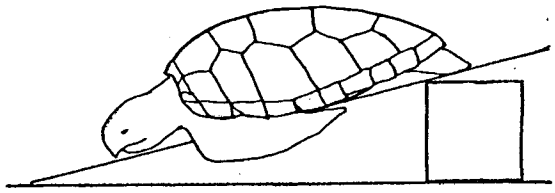
- **If the turtle is actively moving**, it should be retained onboard until evaluated for injuries by a permitted rehabilitation facility. Due to the potential for internal injuries associated with hopper entrainment, it is necessary to transport the live turtle to the nearest rehabilitation facility as soon as possible, following these steps:
  1) Contact the nearest rehabilitation facility to inform them of the incident. If the rehabilitation personnel cannot be reached immediately, please contact Carrie McDaniel at (978) 281-9328 ext. 6525, or Kara Dwyer at (508) 495-2274.
  2) Keep the turtle shaded and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers), and in a confined location free from potential injury.
  3) Contact the crew boat to pick up the turtle as soon as possible from the dredge (within 12 to 24 hours maximum). The crew boat should be aware of the potential for such an incident to occur and should develop an appropriate protocol for transporting live sea turtles.
  4) Transport the live turtle to the closest permitted rehabilitation facility able to handle such a case.

  Do not assume that an inactive turtle is dead. The onset of rigor mortis and/or rotting flesh are often the only definite indications that a turtle is dead. Releasing a comatose turtle into any amount of water will drown it, and a turtle may recover once its lungs have had a chance to drain.

- **If a turtle appears to be comatose** (unconscious), contact the designated stranding/rehabilitation personnel immediately. Once the rehabilitation personnel has been informed of the incident, attempts should be made to revive the turtle at once. Sea turtles have been known to revive up to 24 hours after resuscitation procedures have been followed.
  - Place the animal on its bottom shell (plastron) so that the turtle is right side up and elevate the hindquarters at least 6 inches for a period of 4 up to 24 hours. The

degree of elevation depends on the size of the turtle; greater elevations are required for larger turtles.

- Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches then alternate to the other side.
- Periodically, gently touch the eye and pinch the tail (reflex test) to see if there is a response.
- Keep the turtle in a safe, contained place, shaded, and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers) and observe it for up to 24 hours.
- If the turtle begins actively moving, retain the turtle until the appropriate rehabilitation personnel can evaluate the animal. The rehabilitation facility should eventually release the animal in a manner that minimizes the chances of re-impingement and potential harm to the animal (i.e., from cold stunning).
- Turtles that fail to move within several hours (up to 24) must be handled in the manner described in Appendix C-II-E, or transported to a suitable facility for necropsy (if the condition of the sea turtle allows and the rehabilitation facility wants to necropsy the animal).



Stranding/rehabilitation contacts

Sea Turtles in Virginia

- Mark Swingle and/or Susan Barco, Virginia Marine Science Museum
  Phone: (757) 437-4949
- Jack Musick, Virginia Institute of Marine Science
  Phone: (804) 684-7313

Sea Turtles in Maryland

- Dr. Brent Whitaker and/or David Schofield of the National Aquarium in Baltimore
  Phone: (410) 576-3853

Marine Mammals

- Mark Swingle/Susan Barco (VA)
- Dr. Whitaker/Mr. Schofield (MD)
- Dana Hartley (NOAA Fisheries Stranding Network Coordinator: (508) 495-2090)

APPENDIX E

Sea Turtle Trawling and Relocation Guidelines
(as derived from ACOE South Atlantic Division protocol)

Sea turtle trawling procedures

1. Trawling shall be conducted under the supervision of a biologist approved by the NOAA Fisheries. A letter of approval from NOAA Fisheries will be provided prior to the commencement of trawling.

2. Sea turtles and sturgeon captured pursuant to relocation trawling shall be handled in a manner designed to ensure their safety and viability, and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Captured turtles shall be kept moist, and shaded whenever possible, until they are released. Resuscitation guidelines can be found at 50 CFR 223.206(d)(1) and are included in part in Appendix D.

3. Any turtles captured during the survey shall be measured in accordance with standard biological sampling procedures prior to release, and weighed when possible. Captured sea turtles shall be tagged prior to release with external flipper tags, which shall be obtained prior to the project from the University of Florida's Archie Carr Center for Sea Turtle Research. Sampling data and any external tags shall be recorded on the Sea Turtle Relocation Report (Appendix F).

4. Turtles shall be kept no longer than 12 hours prior to release and shall be released at least 3 miles away from the dredge site (if it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler or relative abundance trawler to keep sweeping the dredge site without interruption). Any sturgeon captured shall be released immediately, if possible away from the dredge site or into already dredged areas.

5. External or internal sampling procedures (e.g., flipper tagging, PIT tagging, blood letting, skin tag sampling, laparoscopies, gastric lavages, mounting satellite or radio transmitters, genetics sampling, etc.) performed on live sea turtles are not permitted under this BO unless the observer holds a valid sea turtle research permit (obtained pursuant to section 10 of the ESA, from the NOAA Fisheries' Office of Protected Resources, Permits Division) authorizing sampling, either as the permit holder, or as designated agent of the permit holder.

6. This BO serves as the permitting authority for any NOAA Fisheries-approved endangered species observer aboard a relocation trawlers or hopper dredge to conduct genetic sampling on dead turtles, without the need for a Section 10 permit, if following the genetics sampling protocol in Appendix I.

7. The trawler will be equipped with two 60-foot nets constructed from 8-inch mesh (stretch) fitted with mud rollers and flats as specified in the Turtle Trawl Nets

Specifications. Paired net tows will be made for 10 to 12 hours per day or night. Trawling will be conducted with the tidal flow using repetitive 15-30 minute (total time) tows in the channel. Tows will be made in the center, green and red sides of the channel such that the total width of the channel bottom is sampled. Positions at the beginning and end of each tow will be determined from GPS Positioning equipment. Trawl speeds shall not exceed 3.5 knots. Tow speed will be recorded at the approximate midpoint of each tow.

8. Methods and equipment will be standardized including data sheets, nets, trawling direction to tide, length of station, length of tow, and number of tows per station. Water temperature measurements will be taken at the water surface each day using a laboratory thermometer. Data on each tow, including weather conditions, air temperature, wind velocity and direction, sea state-wave height, and precipitation, will be recorded on the Sea Turtle Trawling Report.

9. Before trawling begins, the necessary state permits for trawling in Virginia state waters must be obtained from the appropriate party (e.g., State of Virginia, Virginia Marine Resources Commission).

Turtle Trawl Nets Specifications

DESIGN: 4 seam, 4 legged, 2 bridal trawl net
WEBBING: 4 inch bar, 8 inch stretch
top - 36 gauge twisted nylon dipped
side - 36 gauge twisted nylon dipped
bottom - 84 gauge braided nylon dipped
NET LENGTH: 60 ft from cork line to cod end
BODY TAPER: 2 to 1
WING END HEIGHT: 6 ft
CENTER HEIGHT: Dependent on depth of trawl 14 to 18 ft
COD END: Length 50 meshes x 4" = 16.7 ft
Webbing 2 inch bar, 4 inch stretch, 84 gauge braid nylon dipped, 80 meshes around, 40 rigged meshes with 1/4 x 2 inch choker rings, 1 each ½ x 4 inch at end
cod end cover - none
chaffing gear - none
HEAD ROPE: 60 ft ½ inch combination rope (braid nylon with stainless cable center)
FOOT ROPE: 65 ft ½ inch combination rope
LEG LINE: top - 6 ft, bottom 6 - ft
FLOATS: size - tuna floats (football style), diameter - 7 inch length - 9 inch, number - 12 each, spacing - center on top net 2 inches apart
MUD ROLLERS: size 5 inch diameter 5.5 inch length, number - 22 each, spacing - 3 ft attached with 3/8 inch polypropelene rope (replaced with snap on rollers when broken)
TICKLER CHAINS: NONE (discontinued- but previously used 1/4 inch x 74 ft galvanized chain)
WEIGHT: 20 ft of 1/4 inch galvanized chain on each wing, 40 ft per net looped and tied
DOOR SIZE: 7 ft x 40 inches (or 8 ft x 40 inches), Shoe - 1 inch x 6 inch, bridles - 3/8 inch high test chain
CABLE LENGTH (bridle length, total): 7/16 inch x 240-300 ft varies with bottom conditions
FLOAT BALL: none
LAZY LINES: 1 inch nylon
PICKUP LINES: 3/8 inch polypropelene
WHIP LINES: 1 inch nylon

APPENDIX F
Sea Turtle Relocation Report

(Note that any other reporting form submitted for turtles taken in trawling activities related to maintenance dredging should include the following information.)

Channel: _____ Date: _____
Tow #:_____ Net (circle): Port Starboard
Day of trawling effort (e.g., 3rd day) _____ Hour of trawling effort (that day) _____
Water depth_____ Water temperature _____
Other environmental conditions_____

Describe capture location (include state, county, lat and long): _____
_____
Describe capture method and/or type of gear in use when turtle was caught:_____
_____

Species Information: *(please designate cm/m or inches.)*
Species _____ Weight (kg or lbs)_____
Sex (circle): Male Female Unknown How was sex determined? _____
Straight carapace length _____ Straight carapace width _____
Curved carapace length _____ Curved carapace width _____
Plastron length _____ Plastron width _____
Tail length _____ Head width
_____
Condition of specimen/description of animal_____
_____

Flipper Tag Information
Left _____ Right _____
PIT Tag # _____

Miscellaneous:
Blood taken: YES NO _____# of vials Genetic biopsy taken: YES NO
Photos Taken: YES NO Is this a Recapture: YES NO
Organization Tagging _____
Personnel _____ Phone _____

Turtle Release Information:
Date _____ Time _____
Lat _____ Long _____
State _____ County _____

Remarks: (note if turtle was involved with tar or oil, gear or debris entanglement, wounds or mutilations, propellor damage, papillomas, old or new tag locations, etc.)
_____
_____

APPENDIX G

ENDANGERED SPECIES OBSERVER FORM
Maintenance Dredging
Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal

Daily Report

Date: _____
Geographic Site: _____
Location: Lat/Long _____ Vessel Name _____

Weather conditions: _____
_____
Water temperature: Surface _____ Below midwater (if known) _____

Condition of screening apparatus: _____
_____
_____

Incidents involving endangered or threatened species? (Circle) Yes No
(If yes, fill out Incident Report of Sea Turtle/Shortnose Sturgeon Mortality)

Comments (type of material, biological specimens, unusual circumstances, etc:)
_____
_____
_____

Observer's Name: _____
Observer's Signature: _____

BRIDGE WATCH SUMMARY

Species	# of Sightings	# of Animals	Comments

APPENDIX H

Incident Report of Sea Turtle/Shortnose Sturgeon Take
Maintenance Dredging of Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal

Species _____ Date _____ Time (specimen found) _____

Geographic Site _____
Location: Lat/Long _____
Vessel Name _____ Load # _____
Begin load time _____ End load time_____
Begin dump time _____ End dump time _____

Sampling method _____
Condition of screening _____
Location where specimen recovered_____
_____
Draghead deflector used? YES NO Rigid deflector draghead? YES NO
Condition of deflector _____
_____
Weather conditions_____
_____
Water temp: Surface _____ Below midwater (if known) _____

Species Information: *(please designate cm/m or inches.)*
Head width _____ Plastron length _____
Straight carapace length _____ Straight carapace width_____
Curved carapace length _____ Curved carapace width _____

Condition of specimen/description of animal (please complete attached diagram)
_____
_____
_____

Turtle Decomposed: NO SLIGHTLY MODERATELY SEVERELY

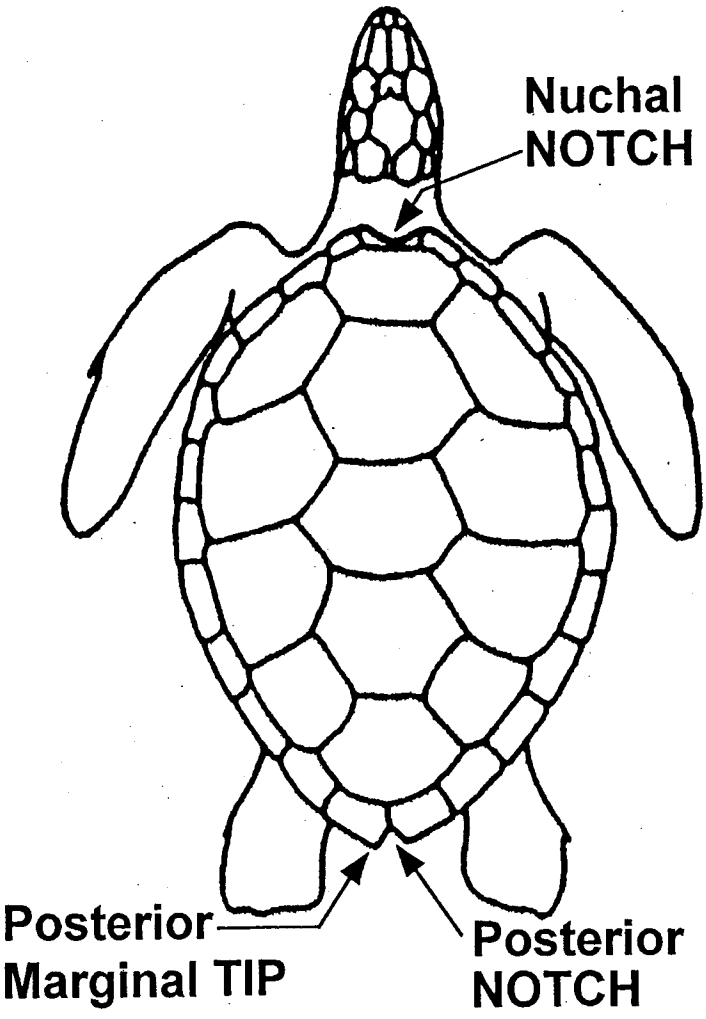
Turtle tagged: YES NO *Please record all tag numbers.* Tag # _____
Genetic sample taken: YES NO
Photograph attached: YES NO
(please label *species, date, geographic site* and *vessel name* on back of photograph)

Comments/other (include justification on how species was identified) _____
_____
_____
_____

Observer's Name _____
Observer's Signature _____

Incident Report of Sea Turtle Take
Maintenance Dredging
Cape Henry, York Spit, York River Entrance, and Rappahannock Shoal

Draw wounds, abnormalities, tag locations on diagram and briefly describe below.



Description of animal:

APPENDIX I.
Protocol for Collecting Tissue from Sea Turtles for Genetic Analysis

Materials for Collecting Genetic Tissue Samples

- surgical gloves
- alcohol swabs
- betadine swabs
- sterile disposable biopsy punches
- sterile disposable scalpels
- permanent marker to externally label the vials
- scotch tape to protect external labels on the vials
- pencil to write on internal waterproof label
- waterproof label, 1/4" x 4"
- screw-cap vial of saturated NaCl with 20% DMSO*, wrapped in parafilm
- piece of parafilm to wrap the cap of the vial after sample is taken
- vial storage box

* The 20% DMSO buffer within the vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you wear gloves each time you collect a sample and handle the buffer vials. DO **NOT** store the buffer where it will experience extreme heat. The buffer must be stored at room temperature or cooler, such as in a refrigerator.

Please collect two small pieces of muscle tissue from all live, comatose, and dead stranded loggerhead, green, leatherback, and hybrid sea turtles (and any hawksbills, although this would be a rare incident). A muscle sample can be obtained no matter what stage of decomposition a carcass is in. Please utilize the equipment in these kits for genetic sampling of **turtles only** and contact Kara Dodge when you need additional biopsy supplies.

Note that genetic samples are not required for the single stock of Kemp's ridleys.

Sampling Protocol for Live or Comatose turtles

1. Stabilize the turtle on its plastron. When turtles are placed on their carapace they tend to flap their flippers aggressively and injuries can happen. Exercise caution around the head and jaws.

2. The biopsy location is the dorsal surface of the rear flipper, 5-10 cm from the posterior (trailing) edge and close to the body. Put on a pair of surgical gloves and wipe this area with a Betadine swab.

3. Wipe the hard surface (plastic dive slate, biopsy vial cap or other available clean surface) that will be used under the flipper with an alcohol swab and place this surface underneath the Betadine treated flipper.

4. Holding a new (sterile and disposable) plastic skin biopsy punch by the thumb and index finger, gently press the biopsy punch into the flesh, as close to the posterior edge of the rear flipper as possible. Press down with moderate force and rotate the punch one or two complete turns to make a circular cut all the way through the flipper. The biopsy tool has a sharp cutting edge so exercise caution at all times.

5. Repeat the procedure twice (one per rear flipper) with the same biopsy punch so that you now have two samples from this animal.

6. Remove the tissue plugs by knocking them directly from the biopsy punch into a single vial containing 20% DMSO saturated with salt. It is important to ensure that the tissue samples do not come into contact with any other surface or materials during this transfer.

7. Use a pencil to write the stranding ID, date, species ID and SCL on the waterproof label and place it in the vial with the samples.

8. Label the outside of the vial using the permanent marker with stranding ID, date, species ID and SCL .

9. Apply a piece of clear scotch tape over the what you have written on the outside of the vial to protect the label from being erased or smeared.

10. Wrap parafilm around the cap of the vial by stretching as you wrap.

11. Place the vial in the vial storage box.

12. Complete the Sea Turtle Biopsy Sample Collection Log.

13. Attach a copy of the STSSN form to the Collection Log - be sure to indicate on the STSSN form that a genetic sample was taken.

14. Wipe the biopsy area with another Betadine swab.

15. Dispose of the used biopsy punch and gloves. It is very important to use a new biopsy punch for each animal to avoid cross contamination.

Sampling Protocol for Dead Turtles

1. Put on a pair of surgical gloves. The best place to obtain the muscle sample is on the ventral side where the front flippers insert near the plastron. It is not necessary to cut very deeply to get muscle tissue.

2. Using a new (sterile and disposable) scalpel cut out two pieces of muscle of a size that will fit in the vial.

3. Transfer both samples directly from the scalpel to a single vial of 20% DMSO saturated with salt.

4. Use the pencil to write the stranding ID, date, species ID and SCL on the waterproof label and place it in the vial with the samples.

5. Label the outside of the vial using the permanent marker with stranding ID, date, species ID and SCL .

6. Apply a piece of clear scotch tape over the what you have written on the outside of the vial to protect the label from being erased or smeared.

7. Wrap parafilm around the cap of the vial by stretching as you wrap.

8. Place the vial in the vial storage box.

9. Complete the Sea Turtle Biopsy Sample Collection Log.

10. Attach a copy of the STSSN form to the Collection Log - be sure to indicate on the STSSN form that a genetic sample was taken.

11. Dispose of the used scalpel and gloves. It is very important to use a new scalpel for each animal to avoid cross contamination.

At the end of the calendar year submit all genetic samples to:

Kara Dwyer Dodge
NOAA Fisheries/NEFSC
166 Water Street
Woods Hole, MA 02543
(508) 495-2274